pwc.com/mine

Mine 2022

A critical transition

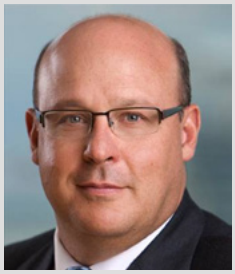
June 2022

pwc

Foreword

PwC is proud to present the 2022 edition of our global *Mine* report. During the construction of this report, the fundamental role that mining plays in underpinning the global transition to clean energy became clear. If the mining industry does not rapidly scale up its discovery and delivery of critical minerals, the prospects of energy transition at scale will be jeopardised.

In turn, mining companies, particularly the Top 40 referred to in this report, must continue to develop strategies wherein trust is seen as a precious commodity. Only by developing and maintaining trust with a broad range of stakeholders will miners' social licence to operate be assured. The successful development and execution of environmental, social and governance (ESG) strategies will go a long way to securing that trust.



Paul A. Bendall
Global Mining Leader
PwC

Executive summary

Amid an accelerating industrywide transformation, the world's Top 40 miners posted stellar financial results for 2021. Revenues rose by 32%, and net profits soared by 127% on the back of high commodity prices and prudent cost management. Add these gains to their strong performance in 2020, and the Top 40 face the future in excellent financial shape.

But how long the big miners can continue their record run is less clear. Our forecast sees revenues growing, but rising costs are putting pressure on margins. The market for mining materials is reconfiguring in fundamental ways. The energy transition and the race to reach net-zero emissions are creating a surge in demand for 'critical minerals.' These are the commodities needed to generate low-emission energy—elements such as lithium, nickel, cobalt and graphite for energy storage; copper and aluminium for energy transmission; and silicon, uranium and rare earth elements for solar, wind and nuclear energy generation.

The supply of such minerals will struggle to meet near-term demand. In addition, there's significant underinvestment in these critical minerals, which will exacerbate the supply–demand situation over the near to medium term. The world will be able to meet its net-zero targets only if the mining industry can substantially ramp up production. That places a strategic imperative on the agenda of the Top 40: making major investments in exploration, production, processing and refining in a responsible and sustainable fashion.

A new generation of miners is fast positioning itself to deliver these critical minerals. These miners are highly focused on meeting the evolving expectations of stakeholders. They've reaped the rewards of acting quickly in this rapidly changing mining market. And they are exploring new business models and creative partnerships to deliver higher value along the entire supply chain.

Miners face challenges on several fronts. Prices for critical minerals can be volatile. New projects take time to permit, finance and construct. Economic deposits are being depleted. Global geopolitics continue to present a range of risks. And expectations for environmental, social and governance (ESG) issues continue to rise.

What it means to be a miner is changing, and the Top 40 must keep up with the pace of that change. There's no single answer to the complex task of transformation. But the world's big miners should be focusing on four key areas:

- Evaluating their exposure to critical minerals and working out where they need to be.
- Revisiting deal strategy and identifying opportunities to own more of the supply chain or to partner with end users and original equipment manufacturers (OEMs).
- Deploying capital and cash flow strategically and at sufficient pace to meet the needs of the transition to net zero.
- Building trust with stakeholders and strengthening mining's social licence to operate by increasing the focus on ESG.

The miners that can successfully address these challenges will be best positioned not only to navigate the changing market dynamics but also to create value and to benefit from the rapidly increasing demand for critical minerals and the energy transition.

内容摘要
Executive summary

行业转型加速，财务业绩亮眼。2021年度，世界前40大矿业公司延续2020年以来的强劲表现，收入上涨了32%，而净利润则骤增127%。在高商品价格以及稳健的成本管理的支持下，“40大矿企”以极佳的财务状况迎接未来。

然而大型矿业企业的这种业绩表现能够持续多久并不明朗。我们可以预见收入的增长，但也看到持续上升的成本对于毛利的压力。与采矿相关的原材料市场正在发生根本上的重整。能源变革和“净零排放”的推进催生对“关键性矿产”需求的激增。“关键性矿产”是指产生低排放能源所需的元素，例如与储能相关的锂、镍、钴和石墨；与输电相关的铜和铝；与太阳能发电、风力发电和核能发电相关的硅、铀和稀土等。

这些关键性矿产的供给满足近期的需求已经捉襟见肘。由于对这些关键性矿产投资的显著不足，这种供需矛盾将在未来短期至中期内进一步加剧。全球“净零排放”的目标能否实现取决于矿业行业能否大幅提高关键性矿产的产量。这将使得40大矿企把以负责任、可持续的方式对待勘探、生产、加工、冶炼方面的重大投资提上至关重要的战略性议事日程。

新一代的矿业企业正在迅速定位于提供这些关键性矿产。他们高度关注如何满足利益相关方不断进化的期望，同时也因在瞬息万变的矿业市场中当机立断获得了回报。这些矿业企业正在探索新的业务模式和创新性的合作关系以在整个供应链中创造更高的价值。

矿业企业面临多方面的挑战：关键性矿产的价格波动，新项目审批、融资和建设周期较长，经济储量面临枯竭，地缘政治仍然存在一系列风险，以及各相关方对环境、社会及治理（“ESG”）问题的期望持续升温。

40大矿企必须跟上变革的脚步以应对这些变化和挑战。转型是一项复杂的任务，并没有一个唯一的答案，但这些世界上最大的矿业企业应当关注四个关键领域：

- 评估他们在关键性矿产方面的投入以及需要达到的水平。
- 重新审视交易战略、识别交易机会，以在供应链中占拥有更多份额，或者与终端用户或代工厂建立合作伙伴关系。
- 战略性配置资本和现金流， 紧跟“净零排放”变革的步伐。
- 提升对ESG的关注以建立利益相关方的信任并强化社会对于矿业经营的认可度。

能够顺利应对这些挑战的矿业企业不但将在变换的市场动态中占据制高点，还能够从对关键性矿产加速增长的需求以及正在发生的能源变革中创造价值并获得收益。

Resumen ejecutivo

Executive summary

En el marco de una aceleración de la transformación en toda la industria, las 40 principales empresas mineras demostraron unos resultados financieros extraordinarios en el año 2021. Los ingresos por ventas crecieron un 32%, y los ingresos netos alcanzaron un 127% soportados por los altos precios de las materias primas y un manejo prudente de los costos. Combinado con el fuerte rendimiento del año 2020, las 40 principales empresas mineras afrontan el futuro con un excelente estado financiero.

No obstante, es incierto saber por cuánto tiempo más pueden continuar las grandes empresas mineras con su éxito. Nuestro pronóstico muestra que los ingresos crecen, pero los incrementos en los costos presionan los márgenes. Asimismo, el mercado de minerales se está reestructurando de forma fundamental, la transición energética y la carrera hacia las emisiones cero está creando un incremento en la demanda de 'minerales críticos.' Estas son las materias primas necesarias para generar energía con bajas emisiones —elementos tales como el litio, níquel, cobalto y grafito, para almacenar energía; cobre y aluminio para transporte de energía; y silicona, uranio y extraños elementos de la tierra para la generación de energía solar, eólica y nuclear.

El suministro de estos minerales no va a ser suficiente para cubrir la demanda en el corto plazo. Adicionalmente, hay una significativa falta de inversión en estos minerales críticos, que va a exacerbar el desequilibrio entre oferta y demanda en el corto y mediano plazo. El mundo va a poder alcanzar las metas de emisiones cero sólo si la industria minera podrá incrementar sustancialmente su producción. Esto plantea una estrategia imperativa en la agenda de las 40 principales empresas mineras: realizar significativas inversiones en exploración, producción, procesamiento y refinación de forma responsable y sostenible.

Una nueva generación de empresas mineras se está posicionando rápidamente para abastecer de estos minerales críticos, focalizándose en cubrir las crecientes expectativas de los grupos de interés y aprovechando los beneficios de actuar pronto en un mercado minero que está cambiando rápidamente. Estas empresas mineras, están explorando nuevos modelos de negocios y alianzas estratégicas para así entregar un valor agregado más elevado a lo largo de toda la cadena de suministros.

Las empresas mineras enfrentan varios desafíos, entre ellos la volatilidad de los precios de los minerales críticos, el tiempo que toman los nuevos proyectos en obtener la licencia para operar, además del financiamiento y la construcción. Los recursos económicos se están agotando y la geopolítica global continúa presentando una serie de riesgos. Por otro lado, las expectativas respecto a los criterios ambientales, sociales y de gobernanza (ESG) continúan en crecimiento.

El concepto de las compañías mineras está cambiando, y las 40 principales empresas mineras deben adaptarse a estos cambios. No hay una sola respuesta a la compleja tarea de transformación, por lo tanto, deben enfocarse en cuatro factores clave:

- Evaluar la exposición a minerales críticos y trabajar en su posicionamiento.
- Revisar la estrategia de transacciones e identificar oportunidades de adquisición de mayores componentes de la cadena de valor o asociarse con usuarios finales y fabricantes de equipos originales (OEMs).
- Asignar el capital y flujo de efectivo estratégicamente y a un paso adecuado para cubrir las necesidades de transición hacia emisiones cero.
- Desarrollar confianza con los grupos de interés y fortalecer la licencia social para operar, incrementando el enfoque en ESG (ambiental, social y gobernanza).

Las empresas mineras que respondan satisfactoriamente a estos desafíos estarán mejor posicionadas para enfrentar los cambios del mercado, crear valor y beneficiarse del rápido crecimiento de la demanda de minerales críticos y de la transición energética que está ocurriendo.

Sommaire

Executive summary

Dans un contexte de transformation accélérée de l'industrie, les 40 plus grandes sociétés minières du monde ont enregistré des résultats financiers exceptionnels en 2021. Leur chiffre d'affaires a crû de 32%, tandis que leur résultat net a bondi de 127% grâce aux prix élevés des matières premières et à une gestion prudente des coûts. À cela s'ajoute leur solide performance de 2020, si bien que ces entreprises sont en excellente santé financière pour affronter l'avenir.

Il est plus difficile toutefois de prédire la durée de cet élan record. Selon nos prévisions, les chiffres d'affaires continueront d'augmenter, mais la hausse des coûts exercera une pression sur les marges. Le marché des matériaux miniers subit des transformations fondamentales. En effet, la transition énergétique et la course vers l'objectif net zéro créent une flambée de la demande de « minéraux essentiels », soit les matières premières requises pour produire de l'énergie à faibles émissions, dont le lithium, le nickel, le cobalt et le graphite pour le stockage de l'énergie, le cuivre et l'aluminium pour le transport de l'énergie, ainsi que le silicium, l'uranium et les terres rares pour la production des énergies solaire, éolienne et nucléaire.

Pour ces minéraux, l'offre pourra difficilement répondre à la demande à court terme. De plus, ces minéraux essentiels font l'objet d'un sous-investissement considérable, ce qui exacerbera le déséquilibre entre l'offre et la demande à court et moyen terme. Or, le monde ne pourra atteindre ses objectifs net zéro que si l'industrie minière arrive à accroître substantiellement sa production. Les 40 principales minières doivent donc se concentrer sur un impératif stratégique: réaliser des investissements importants dans l'exploration, la production, le traitement et le raffinage de façon responsable et durable.

Une nouvelle génération de minières se positionne rapidement pour fournir ces minéraux essentiels. Elles s'efforcent de répondre aux attentes changeantes des parties prenantes en agissant promptement, et leurs efforts portent fruit dans ce marché en évolution rapide. Elles explorent de nouveaux modèles d'affaires et des partenariats créatifs pour générer plus de valeur tout au long de la chaîne d'approvisionnement.

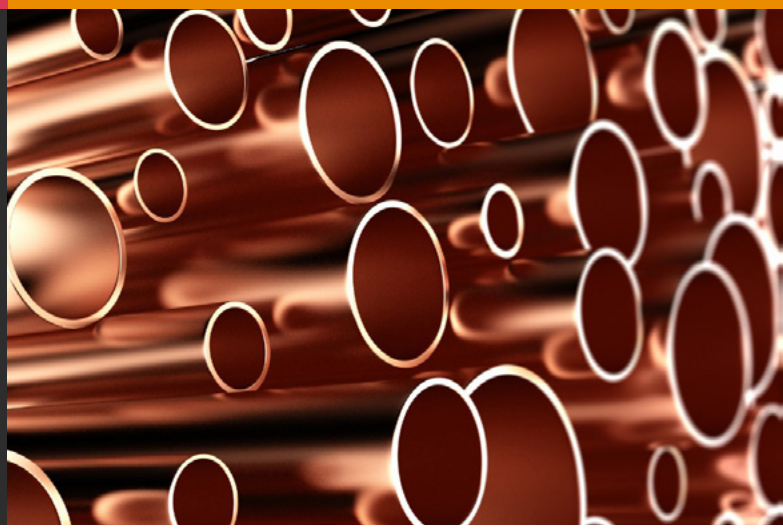
Les minières sont confrontées à des défis provenant de plusieurs fronts. Les prix des minéraux essentiels sont sujets à la volatilité. Les nouveaux projets prennent du temps à être autorisés, financés et construits. Les gisements rentables sont en voie d'épuisement. Les risques géopolitiques mondiaux sont toujours nombreux. Et les attentes à l'égard des enjeux environnementaux, sociaux et de gouvernance (ESG) ne cessent de croître.

La signification du statut de minière est en pleine évolution, et les 40 grandes entreprises de l'industrie doivent suivre le rythme de ces changements. Il n'existe pas de solution unique à la tâche complexe de la transformation, mais les grandes minières du monde doivent se concentrer sur quatre éléments importants:

- Évaluer leur exposition aux minéraux essentiels et se concentrer aux bons endroits.
- Revoir leur stratégie de transactions et identifier les opportunités de dominer une plus grande part de la chaîne d'approvisionnement ou de s'associer avec des utilisateurs finaux ou des équipementiers.
- Déployer stratégiquement leurs capitaux et leurs flux de trésorerie, à un rythme suffisant pour répondre aux besoins découlant de la transition vers le net zéro.
- Gagner la confiance des parties prenantes et renforcer l'acceptabilité sociale de l'exploitation minière en se concentrant davantage sur les facteurs ESG.

Les minières qui parviendront à relever ces défis seront les mieux placées, non seulement pour naviguer dans la dynamique changeante du marché, mais aussi pour créer de la valeur et tirer profit de la croissance rapide de la demande de minéraux essentiels et de la transition énergétique en cours.

Highlights



Financial metrics

Revenues (excluding trading) are up

32%

Net profits are up

127%

Market capitalisation is up

7%

Capital expenditures are up

18% and **dividends** are up **130%**

Critical minerals

Net zero and the energy transition will drive demand for metals.

Demand for energy transition technologies will create enormous annual growth in market value for **nickel, lithium, copper and other critical minerals.**

Market capitalisations for miners of critical minerals **outperformed the average market capitalisations of the Top 40 by between**

49% and **147%**

Supply shortfalls are a near-term risk, **with major implications for the energy transition.**

ESG

ESG is no longer optional or a point of differentiation; it's now the **minimum operating standard.** Stakeholders are increasing the pressure, and **strong social licences, responsible divestitures and tax transparency** will be important for success.

Deals

Deal value increased by

200%

Deal volume increased by

60%

Gold is the largest deal driver in the Top 40. However, **critical minerals deals are gathering steam.**

A critical time for miners

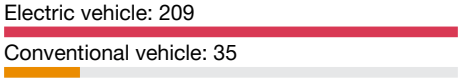
The race to net zero is changing what it means to be a miner. Demand for critical minerals is surging, operating environments are getting more challenging, and new players are emerging. Can the Top 40 respond quickly enough to transform themselves and thrive in a net-zero future?

The shift to net zero will require more mining, not less. The rapid scaling of the low-emission energy systems of the future—solar and wind power, electric vehicles (EVs) and grid-scale batteries—will be highly material-intensive. The production of a solar farm requires three times more mineral resources than a similar-sized coal plant, and constructing a wind farm needs 13 times as much as a comparable gas-fired plant.

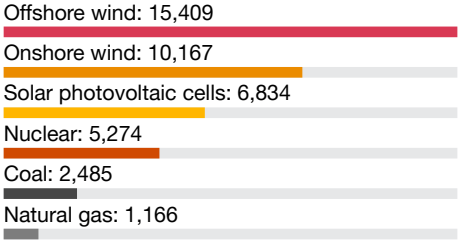
But providing resources for the energy transition is not simply a matter of mining more of the same materials in the same way. Instead, the world will need more critical minerals and raw materials to power the global economy of the future, and these resources will need to be mined sustainably.

Critical minerals content in selected energy transition technologies

Transportation (kg/vehicle)



Power generation (kg/megawatt)



Source: International Energy Agency, 2021

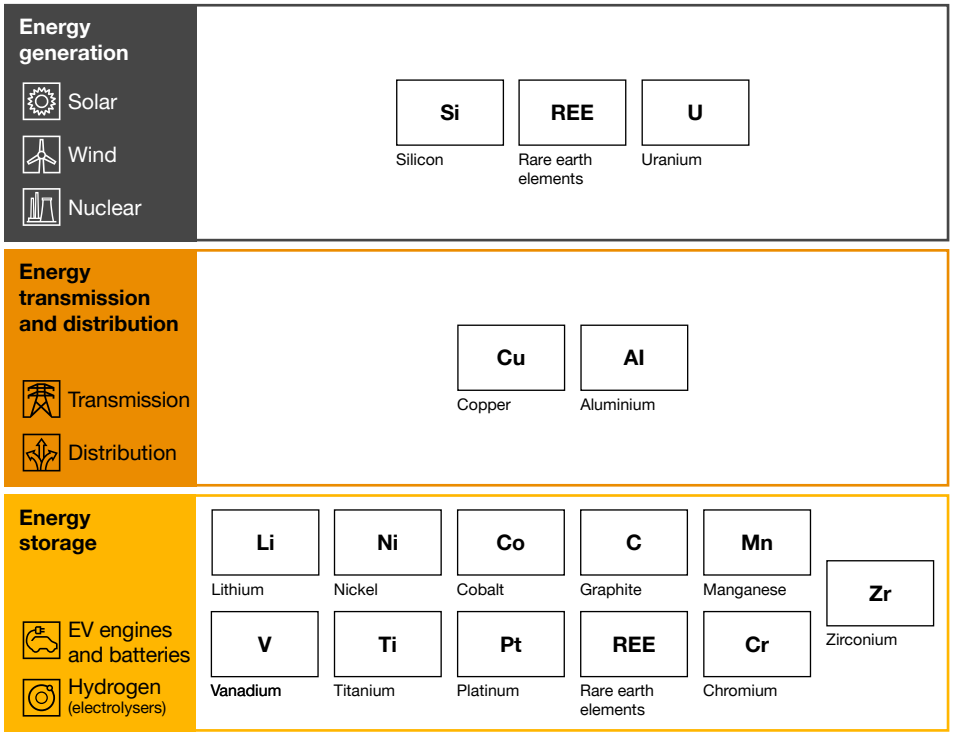
Critical minerals are needed at all stages of the low-carbon energy cycle. They include silicon, rare earth elements and uranium for energy generation; copper, aluminium and steel for distribution networks; and 'battery minerals' such as nickel, lithium and cobalt for energy storage. Many governments around the world have established critical minerals lists to highlight what they see as essential resources for meeting their net-zero commitments and for applications in high tech, defence and other vital industries. But it's the subset of critical minerals with direct application to the energy transition that will experience the greatest growth and dominate the mining industry of the future.

A leading role

Demand for critical minerals is expected to grow significantly over the next three decades. The International Energy Agency estimates that the annual demand for critical minerals from clean energy technologies will surpass US$400bn by 2050, which is equivalent to the annual revenues of the current coal market. This might seem like a long way off, but miners are already struggling to keep up with the demand for critical minerals.

For example, copper, lithium and cobalt are already experiencing supply constraints, and supply imbalances are likely in the near term. The industry's inability to meet demand could have major implications for the cost—and ultimately the pace—of the global uptake and installation of energy transition technologies. Raw materials are the largest cost component of an EV battery. The supply and price of the input battery metals will have the greatest impact on whether EVs will reach cost parity with, and replace, traditional internal-combustion vehicles.

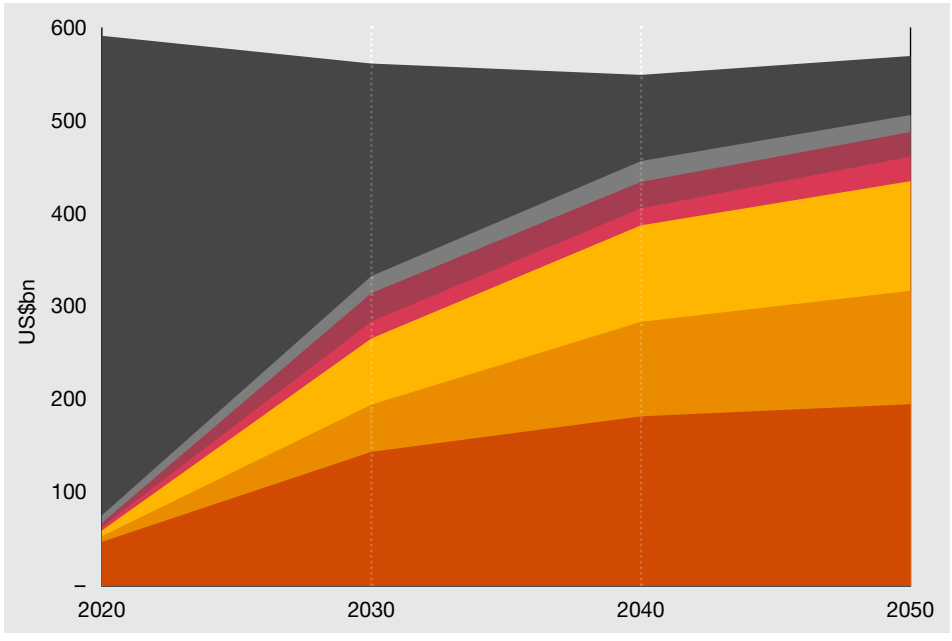
Critical minerals for the energy transition



Infrastructure for the energy transition
The transition will require enormous volumes of traditional infrastructure commodities, such as steel, copper and aluminium.

Source: PwC analysis

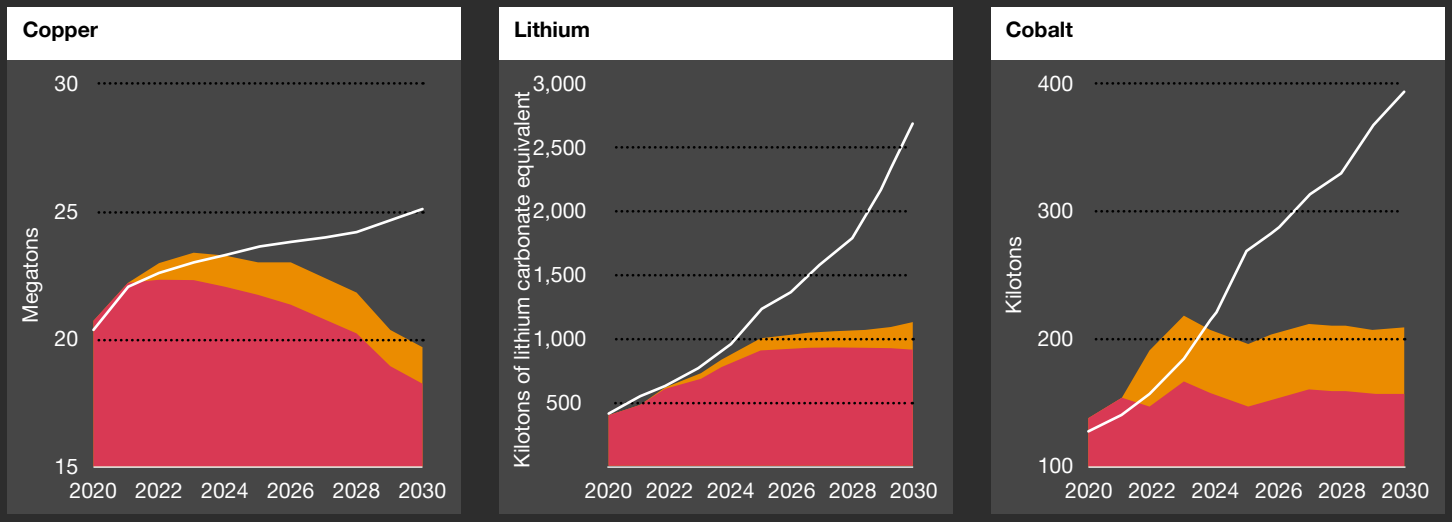
Global market value for coal vs. energy transition minerals



Note: *Other critical minerals* include rare earth elements, silicon and manganese. Estimates are of global annual market value for coal vs. critical minerals demand from energy transition end use only. Estimates do not include other industrial applications.

Source: Adapted from International Energy Agency

Committed mine production and primary demand (2020–30)



Source: Adapted from International Energy Agency

Rising prices

26%

Copper prices were up 26% in 2021.

280%

Lithium prices were up 280% in 2021.

119%

Cobalt prices were up 119% in 2021.

Source: Bloomberg. Lithium prices are based on the BMI Lithium Index, which tracks monthly performance of lithium carbonate and lithium hydroxide.

The Top 40 can play a leading role in the world's clean-energy transition and generate significant stakeholder value while doing so. But they face some challenges.

Development timelines. For new projects, the process of exploration, permitting, financing, construction and commissioning can take more than ten years. Miners and investors aren't allocating capital at the level needed to keep up with the projected demand.

Price volatility. Many critical minerals have volatile price histories and limited price visibility. These characteristics mean that innovative financing solutions are required. Going forward, the role of the offtaker will be more important than ever in developing critical minerals projects.

Geopolitical risks. The critical importance of the end-use industries to the economic health of nations has exacerbated the geopolitical risks of supply chains.

Stakeholder expectations. Higher expectations for ESG performance are here to stay, as governments and other stakeholders turn up the pressure. More than ever, miners need to maintain stakeholder trust.

Economies of scale. Critical minerals typically aren't considered bulk commodities, because deposits often are more discrete and smaller in scale. The Top 40 may need to reassess their threshold for investment. Scale could also be achieved through aggregating supply at distinct infrastructure hubs that miners share.

Economic resource scarcity. Economic resources are being depleted for many critical minerals, including copper, nickel and cobalt. The Top 40 will likely face more complex deposits and jurisdictions, and potentially higher costs in extracting the product and getting it to market. Improvements in technology for exploration and extraction will be essential in keeping pace with demand.

The Top 40 should have a sense of urgency to invest in the exploration, production, processing and refining of critical minerals now, not in a few years' time. The market is demanding it, and a new generation of miners is fast positioning itself to deliver the next generation of minerals.

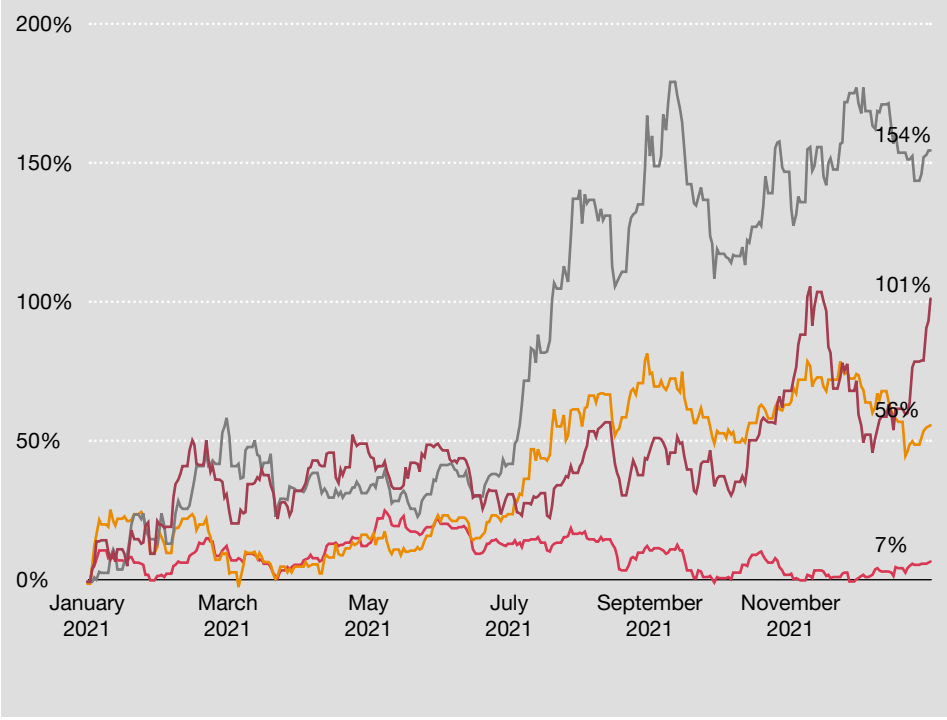
The emerging 'new miners'

The miners that are responding to the demand are reaping significant rewards. In the 12 months through 31 December 2021, the market capitalisation of the Top 5 lithium, graphite and rare earth producers grew by 56%, 101% and 154%, respectively. By comparison, the Top 40's market capitalisation grew by 7%.

The surging demand for critical minerals is transforming what it means to be a miner. For example, some miners are shifting focus towards higher-value 'precursor materials' rather than comparatively lower-value unrefined or concentrate products. Precursor materials are the more refined inputs into energy transition technologies, such as lithium hydroxide rather than spodumene concentrate, or cobalt sulfate rather than a cobalt concentrate. In the past three years, over US$5bn has been invested in lithium hydroxide projects in Western Australia alone.

Growth in market capitalisation in 2021

The Top 5 publicly traded producers by commodity compared to our Top 40



Source: Copyright © 2022, S&P Global Market Intelligence (and its affiliates, as applicable), PwC analysis

Emerging trend 1: Miners are moving down supply chains into value-added processes

Miners are evolving into producers of value-added chemicals. Kwinana, south of Perth, has emerged as one of the world's leading critical minerals and shared infrastructure hubs.

Albemarle Corp.

Kemerton lithium hydroxide processing plant

Albemarle, a global speciality chemicals company and one of the world's largest lithium producers, is constructing a lithium hydroxide processing facility at Kemerton, Western Australia. The Kemerton facility will handle feedstock from Albemarle's stake in the Greenbushes lithium mine.

Production capacity:
60,000 tonnes annual lithium hydroxide

IGO Limited–Tianqi Lithium joint venture

Kwinana lithium hydroxide facility

IGO Ltd acquired a 49% stake in a joint venture with Tianqi Lithium and a 25% stake in the Greenbushes lithium mine for US$1.4bn (December 2020). The joint venture constructed Australia's first lithium hydroxide refinery at Kwinana, with first chemical production achieved in August 2021. The Kwinana facility converts spodumene from the Greenbushes mine.

Production capacity:
50,000 tonnes annual lithium hydroxide

Covalent Lithium joint venture

Mt Holland project and Kwinana refinery

Covalent Lithium is a joint venture between Wesfarmers, one of Australia's largest diversified companies, and SQM. The joint venture is constructing the Mt Holland lithium project, which comprises a mine, a concentrator for spodumene concentrate and a lithium hydroxide refinery at Kwinana, south of Perth, Western Australia.

Production capacity:
50,000 tonnes annual lithium hydroxide

Note: Lithium hydroxide is a cathode precursor material for lithium-ion batteries.

Source: PwC analysis

Diversified critical minerals producer IGO Limited is an example of this new type of operator. In December 2020, the company entered into a US$1.4bn transaction with Tianqi Lithium to acquire a stake in the Kwinana processing plant and the world's biggest lithium mine, Greenbushes, in Western Australia. The Kwinana plant will convert spodumene from the Greenbushes mine into lithium hydroxide to sell directly to battery manufacturers in South Korea and Europe.

Other miners are partnering with OEMs and end users, evolving the traditional business-to-business mining model into a business-to-consumer one. For miners, this change represents an opportunity to establish a reliable point of sale, and for consumers it means the chance to secure a steady supply of materials. In April 2022, Lake Resources entered into a lithium supply deal with Ford Motor Company to supply 25,000 tonnes of lithium a year from its Kachi project in Argentina. Both companies view the deal as an opportunity to scale up environmentally responsible production and ensure high-quality lithium products to support Ford's aggressive EV play.

The next generation of critical minerals miners will focus on extraction, processing, refining and, potentially, manufacturing to deliver a more secure and higher-value supply chain while serving their stakeholders better.

Emerging trend 2: Original equipment manufacturers (OEMs) and end users are partnering directly within mining operations

Many OEMs have progressively moved upstream in their supply chains to secure the supply of critical minerals, particularly the raw materials for lithium-ion batteries. OEMs are entering into joint ventures, partnerships and offtake agreements with miners and processors to secure supply. If the direction of travel continues, we expect to see OEMs become directly involved with critical minerals mining.

BHP Nickel West–Tesla

July 2021

BHP entered into a nickel supply agreement with Tesla, from BHP's Nickel West mine in Australia, one of the world's lower-emissions nickel mines.

BHP and Tesla will look to collaborate on ways to increase sustainability across the battery supply chain.

Vale–Northvolt

March 2022

Vale S.A. agreed to supply nickel to Northvolt AB, the Swedish lithium-ion cell manufacturer. The low-carbon production profile of Vale's nickel is a key feature of the agreement.

Vale has also signed a multiyear nickel deal with Tesla.

Lake Resources–Ford

April 2022

Ford Motor Co. has agreed a preliminary deal to buy lithium from a Lake Resources project in Argentina.

The lithium will form part of a supply solution for Ford's planned US$11.4bn battery manufacturing plants in the US, in partnership with SK Innovation Co.

Indonesia Battery Corp.–LG

April 2022

LG Energy Solution, the world's second-largest battery manufacturer, led a South Korean consortium to develop a US$9bn project in Indonesia to develop the battery supply chain, from mining through the manufacturing of battery cells.

Source: PwC analysis

Adapting to more risk, scrutiny and volatility

The new generation of miners is highly aware of the industry's rapidly changing operating environment. Governments, investors, customers, employees, suppliers and local communities are demanding that operators meet higher standards. Governments in particular are taking on more activist roles to set higher ESG standards for operations, secure supply chains for critical minerals and manage increasing geopolitical risks.

For example, the EU has signalled its intention to increase its scrutiny of supply chains, with particular attention to modern slavery and environmental breaches. The draft rules target various sectors and industries, including mining, and allow for fines and hefty sanctions. Companies and boards will need to demonstrate that they're addressing risks and could be held liable if risks aren't adequately managed. Victims of abuse could sue companies directly for compensation.

Resource nationalism

In April 2022, the Mexican Government nationalised its lithium resources, citing the strategic economic importance of the metal and declaring it the exclusive right of the state. Mexico has the tenth-largest lithium reserves globally. The new legislation has left open the possibility to declare other minerals strategic.

This more assertive regulatory posture comes on top of other factors that are changing the operating environment for the mining industry. The COVID-19 pandemic and the war in Ukraine are placing global supply chains under enormous pressure—and, in fact, actively reshaping them. Governments are responding to geopolitical risks by forming new partnerships and alliances around critical minerals, such as the 2021 Canada–EU critical minerals strategic partnership. Defence pacts such as the Quadrilateral Security Dialogue (Australia, Japan, India and the US) and AUKUS (Australia, the UK and the US) also reflect the need to secure supplies of critical minerals and materials. Given the strategic economic importance of these minerals, resurgent resource nationalism is evident in countries that have significant resources.

The transformation of mining

The Top 40 are where they are because they historically have understood how to generate value and responded to the market accordingly. Now, the combined impact of the energy transition, geopolitics and stakeholder expectations is changing what it means to be a miner. It's no longer simply about extraction.

There's no single approach to address the complex task of transformation. But companies need to position themselves strategically, and with urgency, to benefit from the changing market dynamics and the growth in demand for critical minerals and materials necessary for the energy transition.

Considerations for Top 40 miners

- Review exposure to critical minerals and materials needed for the energy transition.
- Evaluate opportunities to own more of the supply chain and to partner directly with OEMs and local suppliers.
- Incorporate low-emission technologies into operations to position as a preferred supplier for carbon-conscious end users.
- Increase transparency into ESG performance and stakeholder management.
- Evaluate development models around shared infrastructure, potentially expediting development timelines and lowering upfront capital costs.
- Prepare for a more challenging and assertive push by regulators.

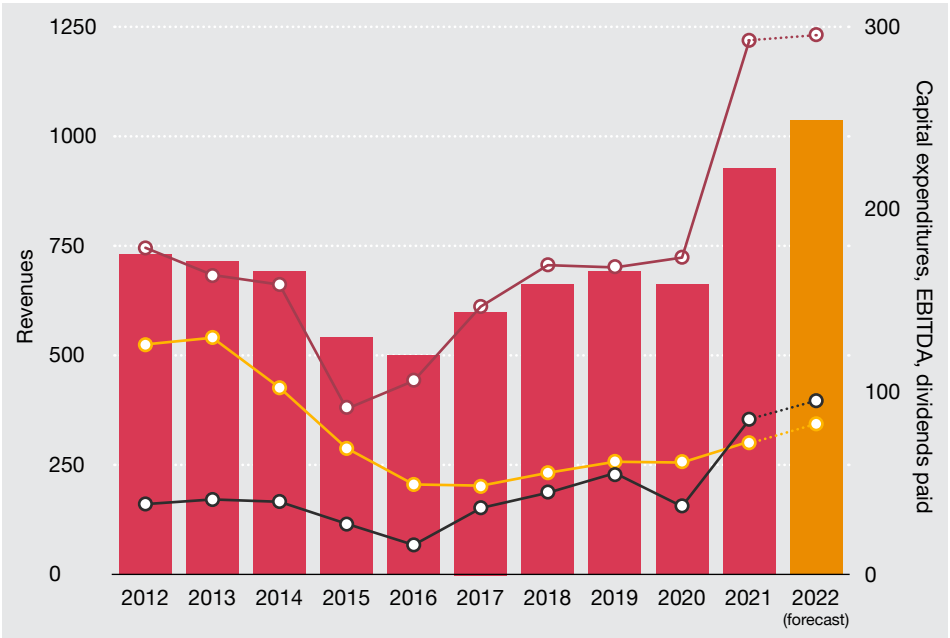
Financial analysis

Positioning for the future

With strong balance sheets and abundant free cash flow, miners have never been better placed to take advantage of new opportunities and ensure sustained outcomes. But time is not on their side, and the future will favour those that can deploy their resources with agility, focus and speed.

Building on a stellar performance in 2020, the Top 40 posted another record result in 2021, with year-on-year revenues up 32% and net profits up 127%. Skyrocketing commodity prices fuelled EBITDA margin growth, and the Top 40's market capitalisation grew by 7% in 2021. Balance sheets remain solid and largely unchanged from 2020.

Top 40 mining companies performance trend (US$bn)



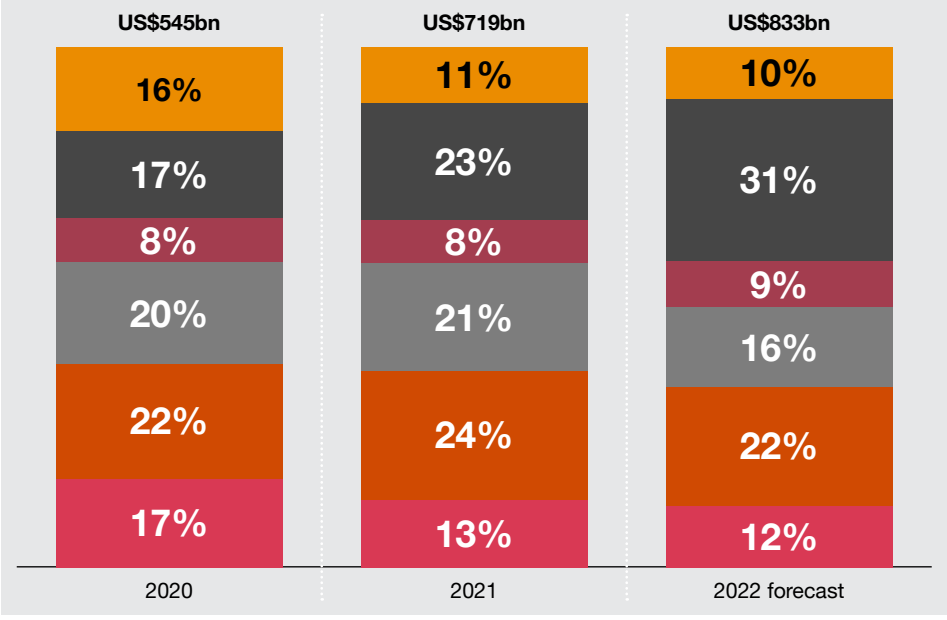
Source: Company annual reports, PwC analysis

Top 40 income statement summary

	US$bn			% change	
	2022 forecast	2021	2020	2021 to 2022 forecast	2020 to 2021
Revenues (excluding trading revenues)	833	719	545	16%	32%
Trading revenues	205	206	112	0%	85%
Operating expenses	(742)	(633)	(482)	17%	31%
EBITDA	**296**	**292**	**174**	**1%**	**68%**
Depreciation and amortisation	(53)	(52)	(50)	2%	4%
Impairment reversal/(expense)	(6)	(6)	(11)	0%	-45%
Net finance costs	(8)	(7)	(10)	14%	-32%
Profit before tax	**228**	**226**	**102**	**1%**	**121%**
Income tax expense	(71)	(67)	(32)	6%	107%
Net profit	**157**	**159**	**70**	**-1%**	**127%**
Profitability measures					
EBITDA margin	28%	32%	26%		
Net profit margin	15%	17%	11%		
Return on capital employed	21%	21%	11%		
Return on equity	26%	26%	12%		

Note: Intersegment revenues have been excluded from the trading results.
Source: Company annual reports, PwC analysis

Top 40 revenue-based commodity mix



Note: *Other critical minerals* of 9% includes nickel, aluminium, palladium, platinum, lithium and cobalt. *Others* of 12% includes a variety of commodities, such as diamonds, rhodium, potash and zinc.
Source: Company annual reports, PwC analysis

32%

Revenues for the Top 40 increased by 32% between 2020 and 2021.

2021 financial results for key commodities

Copper

Price ▲ 50%

Revenues ▲ 47%

Copper again made up the largest share of revenues in 2021. The price of copper is expected to rise modestly over the next 12 months due to the ongoing drive towards clean energy transformation.

Iron ore

Price ▲ 59%

Revenues ▲ 43%

The iron ore price grew strongly in the first half of 2021 as miners struggled to keep pace with rising demand. The price fell in the last quarter as demand, particularly from Chinese steel mills, eased. These price fluctuations highlight the volatility risks associated with geographically concentrated customers. Despite this, year-over-year revenues from iron ore were up.

Coal

Price ▲ 54%

Revenues ▲ 77%

Coal was the biggest contributor to Top 40 revenue growth in 2021, reflecting price increases and the addition of one more coal-focused company into the Top 40. The sudden price growth, contrary to many market watchers' expectations, reflects the uncertainty and volatility of the times. As geopolitical and demand pressures continue, we expect more volatility over the short term.

Gold

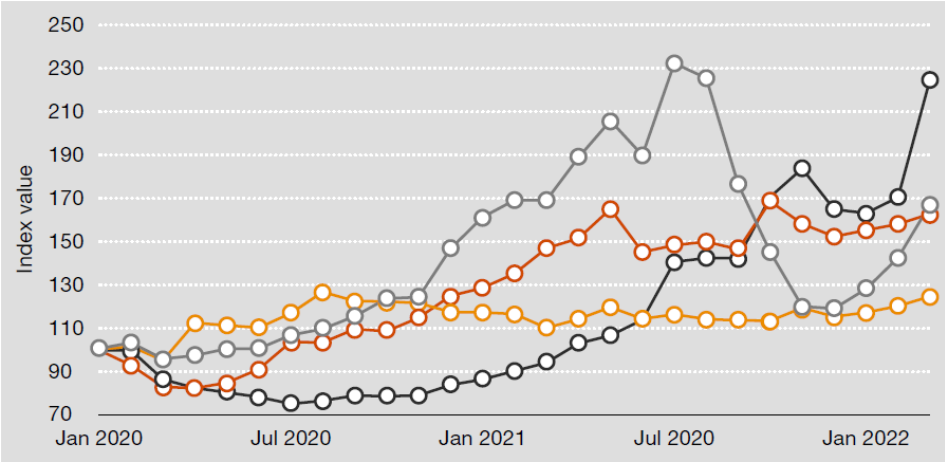
Price ▲ 2%

Revenues ▼ 13%

The performance of gold remained essentially unchanged from 2020, with prices staying relatively consistent year on year. Gold revenues across the Top 40 decreased due in part to the fact that several gold companies fell out of the leaders' group. Unplanned stoppages at some of the largest producers also contributed to the fall in the result.

Note: Price results compare the average commodity price for 2020 to the average price for 2021. Revenue results compare the Top 40's breakdown of revenues for 2020 to revenues for 2021. Price change for coal measures thermal only.

Price index for key commodities



— Coal (thermal and metallurgical) — Copper — Gold — Iron ore

Source: Consensus economics, PwC analysis

The future of thermal coal

Increased demand for thermal coal in Asia, tight supplies of natural gas, and sanctions on Russian coal exports are continuing to increase thermal coal prices in 2022. As a result, coal is forecast to overtake copper as the leading revenue source of our Top 40.

In the medium term, new thermal-coal power plants in Asia will need to secure supply through long-term contracts to meet rising energy demand, in contrast to the trend in other regions of the rapid dismantling of coal-fired power plants. We expect volatility to increase as supply–demand imbalances affect prices. Higher-grade, lower-emission thermal coal will increasingly be preferred.

In the long term, however, demand pressures are expected to ease. Currently, consensus forecasts indicate that prices for thermal coal will decrease significantly over the next decade. With renewable energy becoming increasingly cost-competitive and with net-zero targets set by many countries at the 2021 United Nations Climate Change Conference, more thermal-coal power plants must be shut down over the next decade.

Given that many Top 40 miners have stated an intention to exit coal assets, we don't expect that coal's revenue contribution to the Top 40 will be sustained.

Continued performance amid uncertainty

But how long will the good times last? For the near term, at least, the Top 40's fortunes are looking stable. Expected strong commodity prices through 2022 will underpin a forecasted 16% increase in revenues. The surging price of copper and other critical minerals, such as nickel and aluminium, will drive much of this growth. The iron ore price should ease from its peak over the year, with COVID-19 lockdowns, particularly in China, continuing to cause volatility in demand.

But future revenue gains are susceptible to increasing uncertainty on several fronts. Geopolitical conflicts and supply chain challenges caused by the lingering pandemic could dampen the Top 40's plans to ramp up production in 2022. Costs are expected to rise as a result of inflationary pressures, including forecasted increases in fuel, transport, labour, processing and construction costs. It's been many years since the Top 40 have seen inflationary pressure on their cost base. Despite forecasted revenue growth, the increased costs of doing business will translate to slightly lower margins in 2022, with net profits expected to fall from US$159bn to US$157bn.

82%

of mining CEOs are confident about their company's prospects for revenue growth over the next 12 months, according to PwC's 25th Annual Global CEO Survey.

Summary of Top 40 cash flow

	US$bn			% change	
	2022 forecast	2021	2020	2021 to 2022 forecast	2020 to 2021
Net operating cash flows	214	225	142	-5%	58%
Purchase of property, plant and equipment	(82)	(72)	(61)	14%	18%
Free cash flow	**132**	**153**	**81**		
Dividends paid	(95)	(85)	(37)	12%	130%
Share buybacks	(17)	(11)	(1)	55%	1,000%
Total shareholder returns	**(112)**	**(96)**	**(38)**		
Net repayments of debt	(5)	(7)	(5)	-29%	40%
Other	(4)	(16)	(2)	-75%	700%
Net cash flow	**11**	**34**	**36**		

Source: Company annual reports, PwC analysis

Top 40 balance sheet summary

	US$bn		
	2021	2020	% change
Current assets			
Cash	156	123	26%
Inventories	98	87	13%
Accounts receivable	45	41	8%
Other	71	55	29%
Total current assets	**370**	**307**	**21%**
Non-current assets			
Property, plant and equipment	647	653	-1%
Goodwill and intangible assets	73	62	17%
Investments and loans granted	76	74	3%
Other	69	67	3%
Total non-current assets	865	856	1%
Total assets	**1,235**	**1,163**	**6%**
Current liabilities			
Accounts payable	82	86	-5%
Borrowings	49	44	13%
Short-term lease liabilities	2	2	-7%
Unearned revenue	11	6	83%
Other	90	54	67%
Total current liabilities	**234**	**192**	**22%**
Non-current liabilities			
Borrowings	211	209	1%
Long-term lease liabilities	12	13	-7%
Environmental provisions	66	65	2%
Unearned revenue	11	8	38%
Other	86	101	-15%
Total non-current liabilities	**386**	**396**	**-3%**
Total liabilities	**620**	**588**	**5%**
Net assets	**614**	**575**	**7%**
Total shareholders equity	**614**	**575**	**7%**

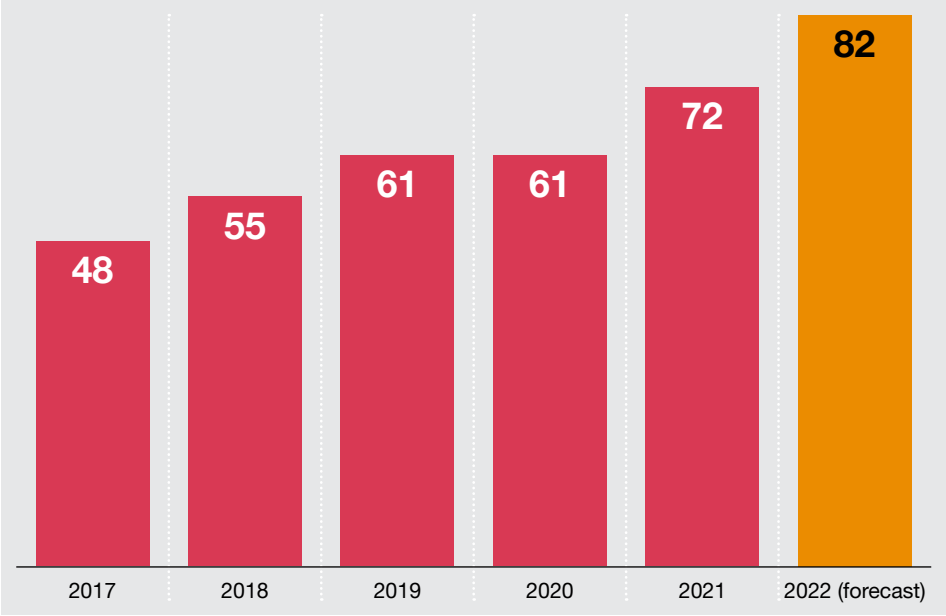
Source: Company annual reports, PwC analysis

Spending wisely

Although investment in capital expenditures and exploration rose in 2021, it fell short of expectations, as supply chain bottlenecks and COVID-19 restrictions delayed key projects. Provided that projects can be delivered, we forecast a 14% increase in capital expenditures in 2022, on top of the 18% increase seen in 2021. As the Top 40 ramp up spending, they'll need to consider their investments carefully, in light of rising inflationary pressures and continued supply chain issues.

Dividends and share buybacks will again be a focus for shareholders, given the Top 40's recent profit results. We expect shareholder returns to increase; large dividends have already been declared in the first four months of 2022 on the strength of 2021 profits. As always, miners need to balance these distributions against long-term growth and rising expectations for increased activity in mergers and acquisitions (M&A) and exploration, particularly in the area of critical minerals.

Top 40 capital expenditures (US$bn)



Source: Company annual reports, PwC analysis

As the incumbents with strong balance sheets, available financing and abundant free cash flow, the Top 40 are in the best shape possible to drive the direction of the industry for decades to come. But despite these companies' size and financial advantages, their window to maximise growth opportunities and create value is closing. Miners must make their move quickly.

Deals

Change is in the air

As deal activity heats up, the Top 40 are well-placed to position themselves to take advantage of the rising demand for critical minerals. But with competition coming from multiple angles, they'll need to think carefully about their next big moves.

In 2021, the value of deals among the Top 40 tripled from 2020, while the number of deals increased by 60%. Gold was the key driver of deal activity, representing about 70% of the total value. Gold miners continue to be well-positioned for M&A, given their low levels of debt and high levels of cash due to high gold prices. We expect gold deals to continue as larger companies look to expand their portfolios and the middle tier looks to consolidate.

Noteworthy gold deals

US$10bn

Agnico Eagle and Kirkland Lake Gold's US$10bn 'merger of equals,' announced in September 2021, has created a company with a significant position in Canada's gold-mining industry.

US$2.8bn

Newcrest Mining's US$2.8bn acquisition of Pretium Resources, announced in November 2021, provides Newcrest with what the company dubbed 'a Tier 1, large scale, long life, low cost mine in a world class jurisdiction.'

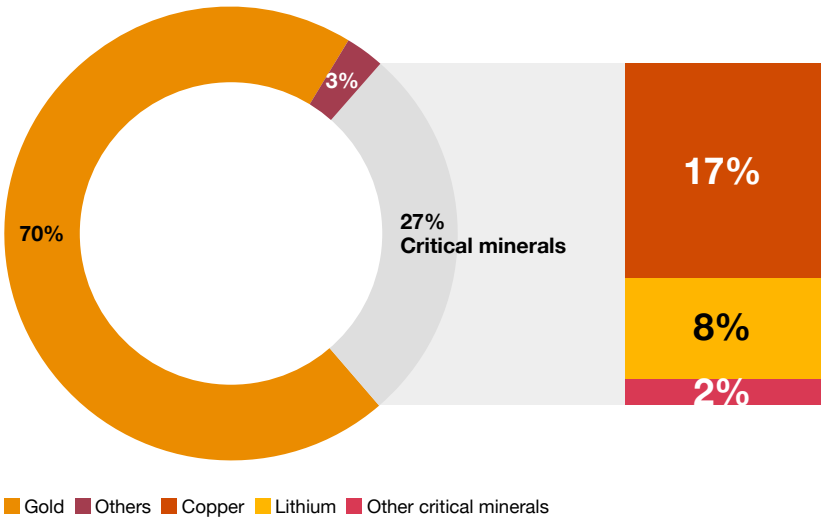
Critical transformation through deals

Although gold has dominated Top 40 deals for the past several years, we're starting to see a significant uptick in critical minerals M&A. Compared with 2020, Top 40 deal value for critical minerals doubled, and the number of deals rose more than fivefold. This trend is evident across the whole mining sector, which has seen 159% growth in critical minerals deal value since 2019. We expect this trend to continue over the next five to ten years as demand for critical minerals grows and assets with high extraction costs become viable as prices rise.

Some of the leading Top 40 are well down the path of re-orientating their portfolios towards forward-looking strategies. In August 2021, BHP announced a divestiture of its oil and gas operations to focus on its potash mine development, a rebalancing that reflects the company's pivot to future-facing commodities. Glencore announced in December 2021 that it intends to simplify its portfolio and accelerate its shift towards the commodities of the future.

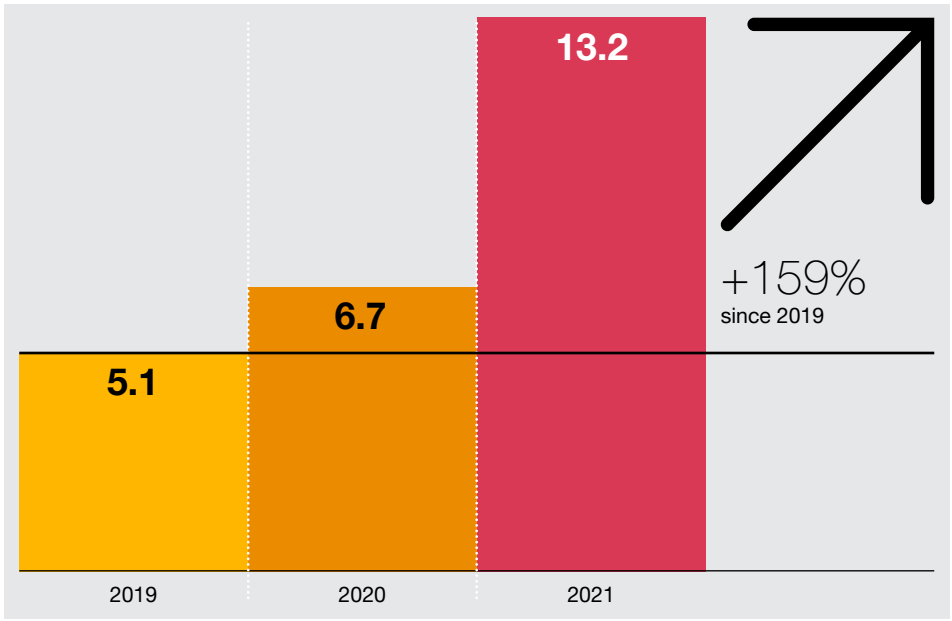
This strategic mindset is likely to lead to greater diversification among the Top 40 as they move into different commodities and situate themselves at new points in the value chain. For example, South African precious metals miner Sibanye-Stillwater Ltd. is aiming to become a serious player in the European battery value chain.

Deals made by the Top 40 in 2021 (by commodity)



Source: Copyright © 2022, S&P Global Market Intelligence (and its affiliates, as applicable)

Value of deals involving critical minerals (US$bn)



Source: Copyright © 2022, S&P Global Market Intelligence (and its affiliates, as applicable)

Noteworthy critical minerals deals

Lithium

Rio Tinto acquired Rincon Lithium for US$825m in a deal announced in December 2021. Rio Tinto expects lithium demand to grow by 25–35% a year over the next decade.

Zijin acquired Neo Lithium for US$760m in a deal announced in October 2021. Zijin's chairman said the deal 'is a good choice for Zijin to enter the field of new energy minerals.'

Copper

South32 acquired Sumitomo's flagship copper mine in Chile for US$2.5bn in a deal announced in October 2021. South32 said the acquisition enables the company to reshape its portfolio for 'a low carbon world' and increases its exposure 'to the commodities important to that transition.'

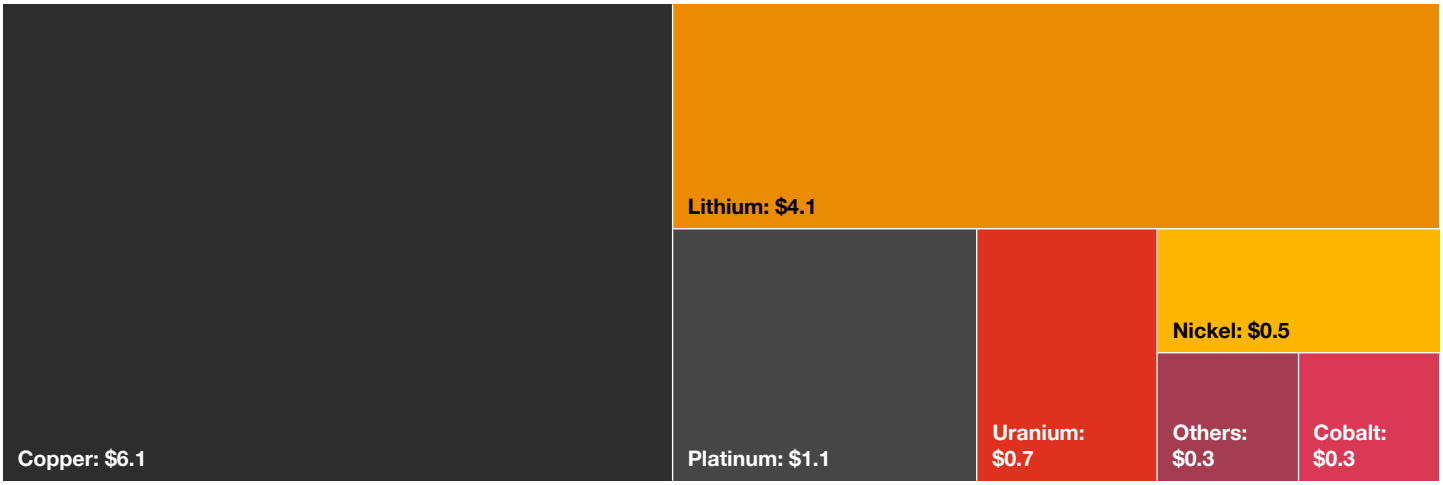
Action outside the Top 40

The Top 40 aren't the only ones making moves in critical minerals; in fact, about half the total M&A value in 2021 happened outside the group. A key deal was Sandfire Resources' US$1.9bn acquisition of Spanish copper miner Minas de Aguas Teñidas, which propelled the Australian copper and gold miner to become a leading copper-focused producer. The US$2.8bn merger of Orocobre Limited and Galaxy Resources created Allkem, now one of the world's largest lithium chemicals companies. According to Galaxy's chairman, 'The merged entity's growth opportunities in both brine and hard rock position it uniquely to take advantage of expected rising EV demand for lithium.'

Given the current and expected growth in demand for critical minerals, it will be interesting to see if some of the larger deals affect the makeup of the future Top 40, with entirely new players entering the frame. Tesla, which owns a claim on a 10,000-acre lithium clay deposit in the US state of Nevada, is considering a vertical integration. Within the last year, the automotive and clean energy company has entered into offtake agreements for its nickel supply with BHP and Vale and for lithium with Liontown Resources and Ganfeng Lithium—two miners outside the Top 40. Similarly, General Motors recently entered into an offtake deal with Glencore for cobalt.

It's worth recognising that the rise in creative deals and partnerships can be disruptive, too. When Canadian investment fund Sprott Asset Management acquired Uranium Participation Corp., a uranium holding company, and went on a buying spree, it drove uranium prices up by 64.5% to a nine-year high of over US$50 per pound.

Critical minerals by deal value (US$bn)



Spinning growth

In June 2021, Anglo American plc completed the demerger of its South Africa thermal-coal operations. The new entity, Thungela Resources Limited, started trading on the Johannesburg Stock Exchange and the London Stock Exchange. By the end of 2021, Thungela Resources' share price had quadrupled.

Coal and iron ore still in play

The shift to net zero is not just creating opportunities in critical minerals. Glencore believes its buyback from joint-venture partners of the remaining two-thirds of coal operations in Colombia for US$588m in January 2022 will have an estimated investment payback period of less than two years. Vale's US$270m sale of its Mozambique coal mine and a logistics corridor and Teck Resources' potential US$8bn disposal of its metallurgical coal operations will create further opportunities in the market as some countries seek to maintain continuity of energy supply while navigating the transition to clean energy.

There has also been renewed interest in iron ore as prices spiked to an all-time high in 2021. A key transaction was Vedanta Resources' US$2.0bn deal to increase its position in its Indian operations.

Strategy is key, and timing is everything

Given the shifting fundamentals and the anticipated strong deal activity over the next several years, deal strategy for the Top 40 is more critical than it has been for a long time. In assessing deal strategy and investment decisions, companies should expect:

- high volatility in the near to medium term
- increased relevance of geopolitics and social licence to operate
- new competition from nontraditional players such as sovereign wealth funds, pension funds, private equity and even OEMs.

The pace and scope of market dynamics mean that mining companies have a very narrow window to assess whether they have the right balance of assets to position themselves for success over the next five to ten years.

ESG

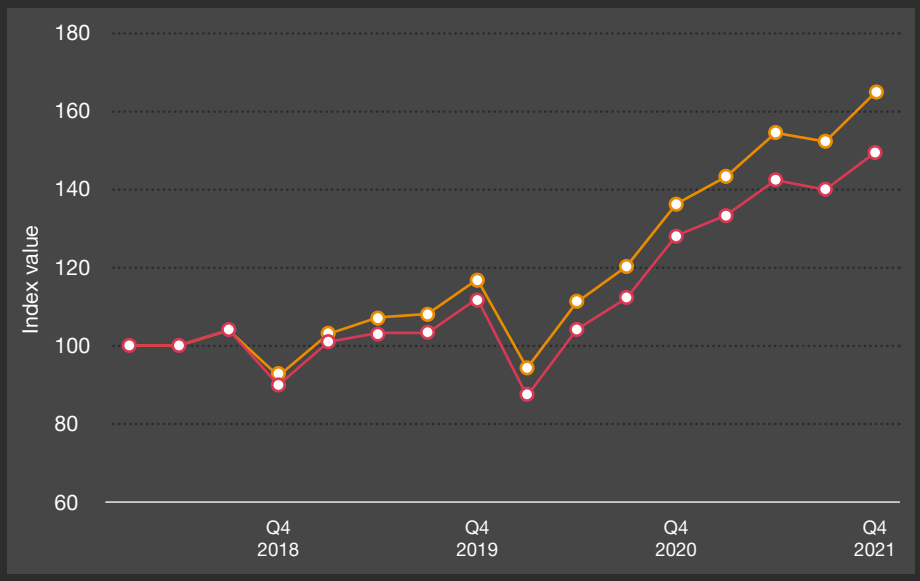
Delivering sustained outcomes and building trust

The mining industry is naturally competitive. But building trust in 'brand mining' can't be done alone. Every miner is responsible for improving the trust that it builds with stakeholders and strengthening mining's social licence to operate. As leaders, the Top 40 play a crucial role.

In all industries, the ESG revolution is upon us. Miners will see tangible business benefits by re-orientating operations around a value proposition that puts people and planet alongside profit. As miners work to provide the minerals to achieve a net-zero future, the societal impact on communities and the broader ecosystem of stakeholders must be front of mind.

Looking at the year ahead, we see key areas where miners should be focusing their attention.

Companies with an ESG focus outperform their peers



— MSCI ACWI index (proxy for general company performance) — MSCI ESG index

Source: MSCI, Copyright © 2022, S&P Global Market Intelligence (and its affiliates, as applicable)

Upping accountability on ESG

ESG presents both risks and opportunities for the Top 40. Governments and regulators are sending clear signals that they will hold companies accountable to operate in more sustainable and ethical ways. The EU is leading the charge with its supply chain scrutiny, but it's not the only jurisdiction taking a firmer posture towards ESG. In 2021, the US Securities and Exchange Commission released a risk alert focusing on 'greenwashing.' The same year, a major Chinese regulatory agency declared its intention to enforce improved sustainability reporting. Japan, Malaysia, India, Singapore and the UK have also made moves towards demanding more transparency and action on ESG from companies.

This increasing pressure provides an opportunity for the Top 40 to position themselves as the global suppliers of choice for ethically and sustainably sourced materials, particularly those destined to power batteries, solar panels, wind turbines and other technologies. Many mining leaders are responding positively to the challenge. Rio Tinto is producing carbon-free aluminium and selling it to Apple to use in its product manufacturing. BHP is supplying nickel sulphate to Toyota and Panasonic to make low-carbon batteries as part of a green EV ecosystem. These initiatives demonstrate that miners and offtakers often need to work together to address the rising ESG expectations from governments and other stakeholders such as employees, local communities and customers.

83%

of mining and metals CEOs see meeting customer expectations as an influential factor that supports meeting their net-zero commitment, according to PwC's 25th Annual Global CEO Survey.

Investment transition

China Shenhua Energy Co., the country's largest listed coal company, plans to shift nearly half of its capital spending to clean energy by the end of the decade.

Trust is a critical material

In the era of critical minerals, maintaining a robust social licence to operate is more essential than ever for success. The demand for critical minerals is outstripping supply in the near term. To meet this shortfall, miners will have to develop more mines, often in previously unmined regions. As they seek to expand, miners will need to put even more effort into meeting community expectations and building trust.

In January 2022, the Serbian Government revoked Rio Tinto's operating permits for the group's US$2.4bn Jadar lithium project in response to environmental protests. The decision eliminated almost one-third of future European lithium production. In the US, Lithium Americas Corp.'s Thacker Pass project has been subjected to legal challenges by environmental groups, and Ioneer Ltd.'s Rhyolite Ridge mine has been weighed down by extended environmental reviews and regulatory disputes. In central Africa, cobalt miners are under pressure to uphold community expectations on worker rights and child labour. These serious matters are a priority that demands miners' attention.

Strengthening social licence starts with forming genuine partnerships that truly respect and benefit local communities and the rights of indigenous peoples. The miners of the future are community-centred and focused on providing skills, decent jobs, worker protection, social and economic development, and inclusion and fairness. Environmental stewardship—responsibly addressing biodiversity conservation, tailings management, water quality and mine closure—is of paramount importance to a miner's legacy. Rightly or wrongly, whole industries are often judged by a few bad projects or companies. Every miner has a role in improving mining's social licence.

Achieving net zero

Pursuing net-zero targets poses a series of choices to miners. They can divest, decommission, reduce emissions in existing operations or offset assets that produce high greenhouse-gas (GHG) emissions. Many of the Top 40 have publicly committed to net-zero targets by offsetting current emissions either through purchasing carbon offsets or investing in solutions that mitigate climate change.

Divesting assets will decrease a miner's GHG emissions on a standalone basis. But in many ways, this move simply

makes the emissions somebody else's challenge. The transfer of assets to third parties increases the risk that those assets may not be decommissioned in a timely or appropriate manner and will continue to contribute to GHG emissions far into the future.

Industry surveys conducted by the International Council on Mining and Metals (ICMM) indicate that nearly 20% of operating mines are likely to close in the decade ahead. This poses challenges not only for mining companies but also for communities and governments on whose land they operate. To manage closures and decommissioning sustainably, miners will need to collaborate with stakeholders on financing, post-mining land-use goals, and transitional support for employees and communities. This is a significant opportunity for miners to establish trust and move the needle on net-zero ambitions.

14%

Only 14% of mining and metals company CEOs have conducted scenario planning regarding where their company will pay taxes in response to the potential global tax-policy change that would make all countries commit to an effective corporate tax rate of at least 15% (the OECD's Pillar 2 tax solution).

Source: PwC's 25th Annual Global CEO Survey

137 countries

As of 4 November 2021, 137 member countries had agreed to the two Pillar solutions proposed by the OECD.

Tax governance momentum

Tax collection continues to be a clear priority for governments, particularly with the need to fund fiscal deficits that were required to mitigate the impact of the pandemic. Inevitably, stakeholders will be keeping a close eye on how miners, particularly the Top 40, respond to this growing scrutiny. Miners must continue to prioritise tax transparency and governance as a key focus within the business.

We have previously emphasised the need for miners to seize the opportunity to ensure that they tell their own story about paying their fair share of tax rather than letting others tell it for them. According to PwC's 25th Annual Global CEO Survey, 48% of mining and metals CEOs moderately to strongly agreed that they effectively communicate to the public all taxes paid. That percentage compares favourably to the general global industry result of 33%.

Barrick Gold Corp. released its first standalone tax-contribution report in April 2022 as an essential component of its annual reporting. In December 2021, the ICMM reaffirmed its commitment to tax transparency and further strengthened existing requirements regarding tax-transparency reports. (More than 50% of the ICCM's members are part of the Top 40.)

Miners have momentum in leading tax-transparency efforts, but there's no time to rest. Over the past year, governments have doubled down on their commitment to ensuring that companies pay their fair share of tax. The OECD continues to advance its Pillar 1 (reallocation of taxing rights) and Pillar 2 (global minimum tax) solutions, with countries moving to implement the international tax reforms at a brisk pace. The OECD estimates that Pillar 1 will reallocate US$125bn of

annual profits and that Pillar 2 will increase annual tax revenues by US$150bn globally. There are proposed exclusions for extractive businesses with respect to Pillar 1. However, we expect that Pillar 2 will affect most, if not all, of the Top 40.

The OECD has set a target date of 2023 for the implementation of Pillar 2. The OECD's preliminary technical guidance on the rules signals a significant degree of complexity in data gathering, administration and compliance. This is a reminder that the Top 40 should make it a priority to review the impact that these rules will have on their business and the formidable effort required to meet the many compliance requirements.

Domestically, governments are developing more comprehensive and sophisticated tax regimes. Chile is seeking to introduce new mining royalties, and Peru is pursuing tax reform to increase taxes on miners. In the US, the state of Nevada recently enacted a new excise tax to fund education, which would double the taxes paid by gold and silver companies. Miners must take note of tax reform not only at the international level but in each jurisdiction where they operate, and they must ensure that they stay compliant.

Making ESG work for mining

Being part of an ethical supply chain, protecting the environment and dealing fairly with communities can help miners win new business and create a premium for their products. In 2021, S&P Global began publishing a 'green aluminium' pricing index, showing that customers are willing to pay an extra US$10–$15 per tonne for aluminium made sustainably. These kinds of green premiums will only continue to grow as consumers become more discerning about supply chains and provenance.

ESG performance also affects the cost of capital. Increasingly, banks and investors are cutting ties with projects that are viewed as unsustainable or unethical. On the other hand, ESG-friendly companies can often access cheaper capital through mechanisms such as green bonds or sustainability-linked loans.

ESG is more than ticking boxes. It's about recognising the transformation taking place in capital, enterprise and society. ESG, like critical minerals, can be a strategic lever that helps miners align themselves within this transformation. ESG should be considered at the heart of what a miner is; this will lead to sustained outcomes that drive value and growth while strengthening our environment and societies.

Transparent supply chains

Fifteen OEMs are members of the Initiative for Responsible Mining Assurance (IRMA), including five EV manufacturers. The recent growth in OEMs' membership in non-governmental organisations such as IRMA and the Copper Mark shows customers' interest in prioritising purchases of materials from ESG-focused miners. 'The path to transparent and sustainable supply chains leads directly to the mine. That's why we welcome the establishment of clear rules,' Volkswagen says about its membership in IRMA.

Key takeaways

Take a position on critical minerals

- Review your exposure to critical minerals and materials for the energy transition.
- Evaluate opportunities to own more of the supply chain or to partner directly with OEMs.
- Evaluate development models around shared infrastructure solutions, potentially expediting timelines and lowering upfront capital costs.

Take advantage of your financial strength

- Leverage rock-solid balance sheets, strong cash flow and a positive earnings outlook to reposition towards long-term growth while balancing shareholder distributions.

Revisit deal strategy

- Think carefully about your M&A strategy in the context of the fundamental changes affecting mining, the market for mining products and your long-term strategic position.
- Consider the impact of high volatility in the short to medium term, increased geopolitical risks and competition from new players.

Double down on ESG

- Every miner has a role to play in building trust in brand mining; establishing strong social licences and responsible M&A is crucial.
- The OECD's Pillar 2 (global minimum tax) is fast approaching, and miners should act quickly to prepare for its potential impact.
- Green premiums and a reduced cost of capital are opportunities resulting from ESG that miners should explore further.

Top 40 global mining companies

2022 rank	2021 rank	Change from 2021 rank	Company	Country	Year end	Commodity focus
1	1	-	BHP Group Limited	Australia/UK	30 June	Diversified
2	2	-	Rio Tinto Group	Australia/UK	31 Dec	Diversified
3	3	-	Vale S.A.	Brazil	31 Dec	Diversified
4	8	▲ 4	Glencore plc	Switzerland	31 Dec	Diversified
5	5	-	China Shenhua Energy Company Limited	China	31 Dec	Coal
6	11	▲ 5	Freeport-McMoRan Inc.	United States	31 Dec	Copper
7	9	▲ 2	Anglo American plc	UK/South Africa	31 Dec	Diversified
8	7	▼ (1)	Newmont Corporation	United States	31 Dec	Gold
9	6	▼ (3)	MMC Norilsk Nickel	Russia	31 Dec	Nickel
10	4	▼ (6)	Fortescue Metals Group Limited	Australia	30 June	Iron ore
11	12	▲ 1	Zijin Mining Group Company Limited	China	31 Dec	Diversified
12	13	▲ 1	Grupo México, S.A.B. de C.V.	Mexico	31 Dec	Copper
13	10	▼ (3)	Barrick Gold Corporation	Canada	31 Dec	Gold
14	22	▲ 8	Saudi Arabian Mining Company (Ma'aden)	Saudi Arabia	31 Dec	Diversified
15	37	▲ 22	Tianqi Lithium Corporation	China	31 Dec	Lithium
16	14	▼ (2)	Public Joint Stock Company Polyus	Russia	31 Dec	Gold
17	20	▲ 3	Shaanxi Coal Industry Company Limited	China	31 Dec	Coal
18	21	▲ 3	Hindustan Zinc Limited	India	31 Mar	Zinc
19	16	▼ (3)	Antofagasta plc	United Kingdom	31 Dec	Copper
20	15	▼ (5)	China Molybdenum Co., Ltd.	China	31 Dec	Diversified
21	23	▲ 2	First Quantum Minerals Ltd.	Canada	31 Dec	Copper
22	32	▲ 10	Teck Resources Limited	Canada	31 Dec	Diversified
23	38	▲ 15	The Mosaic Company	United States	31 Dec	Potash
24	NEW	-	Yankuang Energy Group Company Limited	China	31 Dec	Coal
25	18	▼ (7)	Newcrest Mining Limited	Australia	30 Jun	Gold
26	35	▲ 9	South32 Limited	Australia	30 Jun	Diversified
27	17	▼ (10)	Agnico Eagle Mines Limited	Canada	31 Dec	Gold
28	19	▼ (9)	Shandong Gold Mining Co., Ltd.	China	31 Dec	Gold
29	25	▼ (4)	Coal India Limited	India	31 Mar	Coal
30	29	▼ (1)	Impala Platinum Holdings Limited	South Africa	30 Jun	Platinum group metals
31	33	▲ 2	Public Joint Stock Company ALROSA	Russia	31 Dec	Diamond
32	40	▲ 8	China Coal Energy Company Limited	China	31 Dec	Coal
33	27	▼ (6)	Kirkland Lake Gold Ltd.	Canada	31 Dec	Gold
34	NEW	-	Ivanhoe Mines Ltd.	Canada	31 Dec	Diversified
35	39	▲ 4	Gold Fields Limited	South Africa	31 Dec	Gold
36	36	-	Jiangxi Copper Company Limited	China	31 Dec	Copper
37	26	▼ (11)	Fresnillo plc	Mexico	31 Dec	Diversified
38	NEW	-	Cameco Corporation	Canada	31 Dec	Uranium
39	24	▼ (15)	Sibanye-Stillwater Limited	South Africa	31 Dec	Platinum group metals and gold
40	31	▼ (9)	AngloGold Ashanti Limited	South Africa	31 Dec	Gold

Note: 2021 rankings are from PwC's *Mine 2021: Great expectations, seizing tomorrow.*

Constructing the report

Our analysis includes major companies from all parts of the world whose primary business is assessed to be mining. The results aggregated in this report have been sourced from the latest publicly available information, primarily annual reports, and financial reports available to shareholders. Our report also expresses PwC's point of view on topics affecting the industry, developed through interactions with our clients and other industry leaders and analysis.

Companies have different fiscal year ends and report under different accounting regimes, including International Financial Reporting Standards (IFRS) and United States Generally Accepted Accounting Principles (US GAAP). Information has been aggregated for the individual companies, and no adjustments have been made based on different reporting requirements. As far as possible, we have aligned company financial results to be as at, and for, the year ended 31 December 2021. For companies that do not have December year ends, we added and deducted the reviewed results to reflect the comparable 12-month period. The aggregated financial information of the Top 40 includes the results of the Top 40 mining companies as reported in each respective edition of PwC's *Mine* report.

All figures in this publication are reported in US dollars, except where specifically stated. The balance sheets of companies that report in currencies other than US dollars have been translated at the closing US dollar exchange rate, and the cash flow and financial performance have been translated using average foreign exchange rates for the respective years.

Some diversified miners undertake part of their activities outside the mining industry, such as the oil and gas businesses of BHP and Freeport-McMoRan, parts of the Rio Tinto aluminium business, and Glencore's marketing and trading revenues and costs. We have not excluded these activities from the aggregated financial information, except where noted. Where their primary business is outside the mining industry, companies have been excluded from the Top 40 listing.

All royalty companies and metal streamers are excluded. Entities that are controlled by others in the Top 40 and consolidated within their results have been excluded, even where minority stakes are listed.

2022 outlook methodology

Income statement

We have forecast revenues from the sale of commodities based on the critical inputs of commodity price and production volumes. Foreign exchange has been considered in various aspects of expenses. However, there is a wide variety of functional and operating currencies used by the Top 40, and therefore estimates are subject to judgment being applied.

For commodity prices, we used the latest consensus economic data available for each of the major commodities mined by the Top 40, coupled with the latest available production estimates for the 2022 financial year from annual reporting or, where available, more recent public information releases made before this publication was finalised.

The key driver of the increase in revenues into FY22 is commodity prices.

Finance costs are expected to increase through the year, reflecting forecast increases in benchmark interest rates.

Taxes are forecast with reference to the average effective tax rate over the past eight years, with the exception of notable anomalies.

Cash flow statement

Cash flow from operations was forecast with reference to movement in EBITDA. The drivers of working capital balances are expected to move in line with their historical tendencies, and no material movement in working capital adjustment is expected.

Investing cash flows include capital expenditures and have been forecast based on guidance issued by our Top 40 at the date of the report.

Dividends paid are expected to increase with reference to amounts declared at the date of the report. Net debt repayments are expected to remain stable.

Share buybacks are based on history and announcements made at the date of the report.

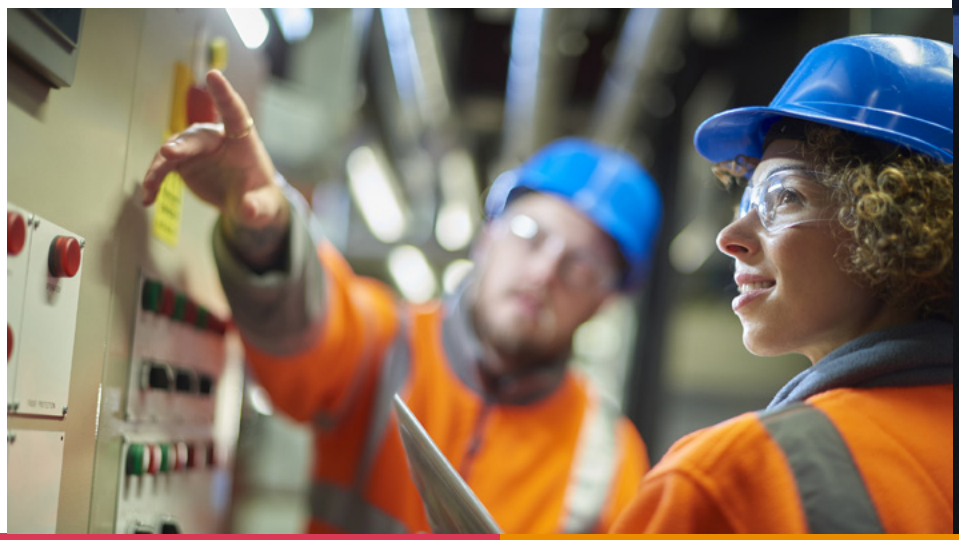
Ten-year trend, US$bn

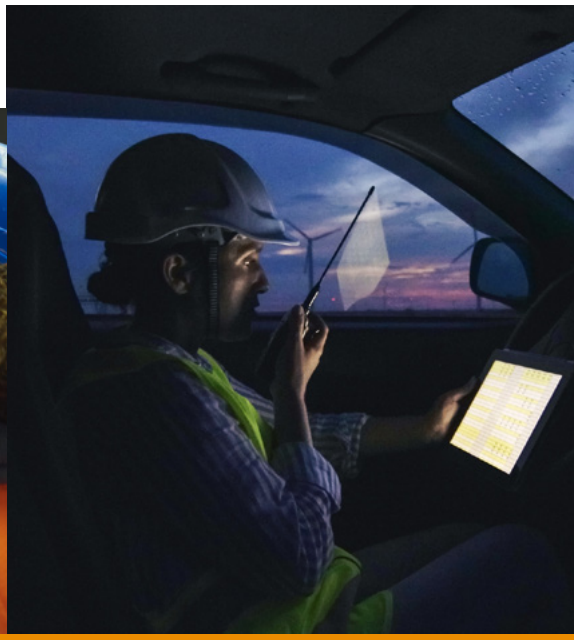
	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012
Aggregate market capitalisation	1,203	1,120	898	757	926	714	494	791	958	1,234
Aggregated income statement										
Revenues	925	656	692	683	600	496	539	690	719	731
Operating expenses	(633)	(482)	(524)	(518)	(454)	(390)	(448)	(531)	(554)	(553)
EBITDA	292	174	168	165	146	106	91	159	165	178
Impairment charges	(6)	(11)	(14)	(12)	(4)	(19)	(53)	(27)	(57)	(45)
Amortisation, depreciation and impairment	(52)	(50)	(50)	(47)	(41)	(44)	(42)	(48)	(42)	(34)
Net finance cost	(7)	(10)	(14)	(13)	(11)	(9)	(19)	(15)	(16)	(6)
Profit before tax	226	102	89	93	90	34	(23)	69	50	93
Income tax expense	(67)	(32)	(29)	(27)	(29)	(15)	(4)	(24)	(30)	(25)
Net profit/(loss)	159	70	61	66	61	19	(27)	45	20	68
EBITDA margin	32%	26%	24%	24%	24%	21%	17%	23%	23%	24%
Aggregated cash flow statement										
Operating activities	225	142	130	134	119	89	92	127	124	137
Investing activities	(71)	(56)	(69)	(63)	(46)	(40)	(69)	(93)	(125)	(169)
Financing activities	(117)	(51)	(66)	(70)	(63)	(44)	(31)	(31)	(3)	21
Dividends paid	(85)	(37)	(55)	(43)	(36)	(16)	(28)	(40)	(41)	(38)
Share buybacks	(11)	(1)	(7)	(15)	(7)	(4)	(7)	(6)	(4)	(5)
Free cash flow	153	81	69	77	71	40	23	24	(6)	11
Aggregated balance sheet										
Cash	156	123	88	101	102	86	82	83	168	104
Property, plant and equipment	647	653	649	610	663	616	579	745	712	701
Total assets	**1,235**	**1,163**	**1,139**	**1,080**	**1,129**	**1,063**	**1,047**	**1,231**	**1,256**	**1,245**
Total liabilities	**620**	**588**	**576**	**540**	**573**	**563**	**569**	**630**	**624**	**563**
Total equity	**614**	**575**	**563**	**540**	**556**	**500**	**478**	**601**	**632**	**682**

Note: The information included above includes the aggregated results of the Top 40 mining companies as reported in each respective edition of PwC's *Mine*.
Source: Company annual reports, PwC analysis

Glossary

Terms	Definition
Battery minerals	The raw materials used in the production of batteries, including lithium, nickel, cobalt, manganese and graphite
Capital employed	Property, plant and equipment plus current assets less current liabilities
Capital expenditure	Purchases of property, plant and equipment plus exploration expenditure
CEO	Chief executive officer
Critical minerals	Critical minerals may be defined differently depending on jurisdiction. For the purposes of this report, we considered the commodities needed to generate low-emission energy, such as lithium, nickel and cobalt for energy storage; copper and aluminium for energy transmission; and silicon, uranium and rare earth elements for solar, wind and nuclear energy generation.
Current ratio	Current assets divided by current liabilities
Dividend payout ratio	Dividend per share divided by earnings per share
Dividend yield	Dividend per share (including buybacks) divided by the closing share price at the respective financial year end
EBITDA	Earnings before interest, tax, depreciation, amortisation and impairments
EBITDA margin	EBITDA divided by revenues
EPS	Earnings per share
ESG	Environmental, social and governance issues
EU	European Union
EV	Electric vehicle
Free cash flow	Operating cash flows less purchases of property, plant and equipment
Gearing ratio	Net borrowings divided by equity
GHG	Greenhouse gas
ICMM	International Council on Mining and Metals
IRMA	Initiative for Responsible Mining Assurance
M&A	Mergers and acquisitions
Market capitalisation	The market value of the equity of a company, calculated as the share price multiplied by the number of shares outstanding
Net assets	Total assets less total liabilities
Net borrowings	Total borrowings less cash
Net profit margin	Net profits divided by revenues
Net zero	The state at which greenhouse gases produced are equal to greenhouse gases removed from the atmosphere
OECD	Organisation for Economic Co-operation and Development
OEM	Original equipment manufacturer
PBT	Profit before tax
PGM	Platinum group metals: iridium (Ir), osmium (Os), palladium (Pd), platinum (Pt), rhodium (Rh) and ruthenium (Ru)
Quick ratio	Current assets less inventory, divided by current liabilities
REE	Rare earth elements
Return on capital employed (ROCE)	Net profits excluding impairment divided by capital employed
Return on equity (ROE)	Net profits divided by equity
Top 40	The world's 40 largest mining companies by market capitalisation as of 31 December 2021
Total borrowings	Long-term borrowings plus short-term borrowings plus lease liabilities
Total borrowings to equity	Total borrowings divided by equity
Working capital	Inventory plus trade receivables less trade payables





S&P Capital IQ waiver

Reproduction of any information, data or material, including ratings ('Content') in any form is prohibited except with the prior written permission of the relevant party.

Such party, its affiliates and suppliers ('Content Providers') do not guarantee the accuracy, adequacy, completeness, timeliness or availability of any Content and are not responsible for any errors or omissions (negligent or otherwise), regardless of the cause, or for the results obtained from the use of such Content. In no event shall Content Providers be liable for any damages, costs, expenses, legal fees, or losses (including lost income or lost profits and opportunity costs) in connection with any use of the Content. A reference to a particular investment or security, a rating or any observation concerning an investment that is part of the Content is not a recommendation to buy, sell or hold such investment or security, does not address the suitability of an investment or security and should not be relied on as investment advice. Credit ratings are statements of opinions and are not statements of fact.

Mine 2022 writing team

For a deeper discussion, please contact one of our regional leaders in the PwC network or your local PwC partner:

Lauren Bermack, *Mine 2022* Lead Partner (PwC Canada); Eric Hau (PwC Canada); Chris Harris (PwC Australia); Mario Iturri (PwC Canada); Conrad Mulherin (PwC Australia); Juan Manuel de Carvalho (PwC Canada); Michelle Botas (PwC Australia); Sarah Bennett (PwC Canada); Lambertus Schrap (PwC South Africa)

We are also pleased to recognise contributions from Deming Pei (PwC China), Xin Liang (PwC China), Rémi Barbier (PwC Chile) and Ignacio Escalona (PwC Chile).

Global mining leadership team

Global Mining Leader

Paul A. Bendall
PwC Australia
+61 3 8603 3891
paul.a.bendall@pwc.com

Africa

Andries Rossouw
PwC South Africa
+27 82 551 0781
andries.rossouw@pwc.com

Argentina

Leonardo Viglione
PwC Argentina
+54 11 4850 4690
leonardo.viglione@pwc.com

Australia

Debbie Smith
PwC Australia
+61 7 3257 8286
debbie.smith@pwc.com

Wim Blom
Global Mining Deals Leader
PwC Australia
+61 7 3257 5236
wim.blom@pwc.com

Franz Wentzel
Global Mining Consulting Leader
PwC Australia
+61 7 3257 8683
franz.j.wentzel@pwc.com

Brazil

Ronaldo Valiño
PwC Brazil
+55 21 3232 6015
ronaldo.valino@pwc.com

Canada

Kevin Chan
Global Mining Tax Leader
PwC Canada
+1 416 941 8321
kevin.t.chan@pwc.com

Chile

Colin Becker
PwC Chile
+56 229400689
colin.becker@pwc.com

China

Rita Li
PwC China
+86 10 65332365
rita.li@cn.pwc.com

India

Yogesh Daruka
PwC India
+91 33 4404 4288
yogesh.daruka@pwc.com

Indonesia

Sacha Winzenried
PwC Indonesia
+62 21 5212901
sacha.winzenried@pwc.com

Peru

Pablo Saravia Magne
PwC Peru
+51 1 2116500
pablo.x.saravia@pwc.com

United States

David Buist
PwC US
+1 303 886 4500
david.buist@pwc.com

pwc.com/mine