

SECTOR IN-DEPTH

23 September 2024



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Metals & Mining – Global

Reclamation obligations at \$78 billion and rising, posing credit risk for miners

Summary

Rising asset retirement obligations for mining companies could top industry's debt obligations by 2033. The sum of the noncurrent AROs — costs for environmental reclamation and site restoration once mining ceases — reached \$72 billion for the 24 largest rated mining companies we reviewed for this report. That is equivalent to about 42% of outstanding mining industry long-term debt at fiscal year-end 2023. The rate at which these obligations grew accelerated significantly over the last five years, notwithstanding higher nominal discount rates and asset divestitures. [Rio Tinto plc](#) (A1 stable) had the largest ARO provision at the end of 2023, followed by [BHP Group Limited](#) (A1 stable), [Newmont Corporation](#) (Baa1 positive), [Glencore plc](#) (A3 stable) and [Vale S.A.](#) (Baa3 positive). Total AROs, including current provisions, stood at \$78 billion at the end of FY2023.

- » **Growing land disturbance, evolving regulations, cost inflation and greater societal focus drive up asset retirement obligations.** Mining companies, on average, disturb more land annually than they rehabilitate through progressive rehabilitation, despite adopting the mitigation hierarchy approach and progressively rehabilitating affected areas. That leads to increasing reclamation liabilities. Changes in environmental regulations, significant industry cost inflation and greater investor and societal focus on biodiversity and natural capital also contribute.
- » **Spending on AROs more than doubled since 2018, likely to grow.** The 24 mining companies we examined spent \$1.4 billion-\$1.8 billion annually on AROs during the 2013-2018 period. However, since 2018, ARO payments more than doubled, reaching about \$3.7 billion in 2023, which represents a 5-year CAGR of 18.2%. Mining companies must also provide financial guarantees to ensure adherence to environmental regulations, rehabilitation commitments and to fulfill local permitting requirements. We expect the ARO payments to keep growing, driven by industry cost inflation, rising land disturbance and continued evolution of environmental regulations.
- » **Credit risks vary across companies and are mostly low for now, but could escalate.** Credit risks for most mining companies evaluated in this report are low in the near term. However, these risks vary across entities and could become clearer over time. Unless commodity prices increase and remain at higher levels, the dependence of mining companies on open pit mining that disturbs more of the environment, as well as growing spending on AROs and financial guarantees, could reduce cash flow and liquidity and tie up capital. Those funds are needed to sustain production amid diminishing ore grades, invest in new projects, decarbonize operations and meet energy transition commitments.

About this report

This report examines asset retirement obligations (AROs/reclamation liabilities) of the largest metals and mining companies (M&M) rated by Moody's Ratings, the credit risks resulting from their reliance on natural capital, and how these companies manage this inherent exposure. The report includes data on current (short-term) and noncurrent (long-term) AROs, annual cash spending on these obligations, revenue, operating cash flow, long-term debt and capital expenditures of 24 rated global metal and mining companies with the 5-year average annual Moody's-adjusted EBITDA of at least \$1 billion. The report also includes the analysis of the land use as reported by companies that comply with the Global Reporting Initiative (GRI) MM1 Standard. This report does not include any environmental liabilities related to litigation, other environmental liabilities unrelated to closure plans, legacy cleanup provisions or obligations that could not be reliably estimated by companies, in part, because potential closure dates for assets not tied to a specific orebody are unknown.

AROs of mining companies could exceed their reported debt obligations by 2033

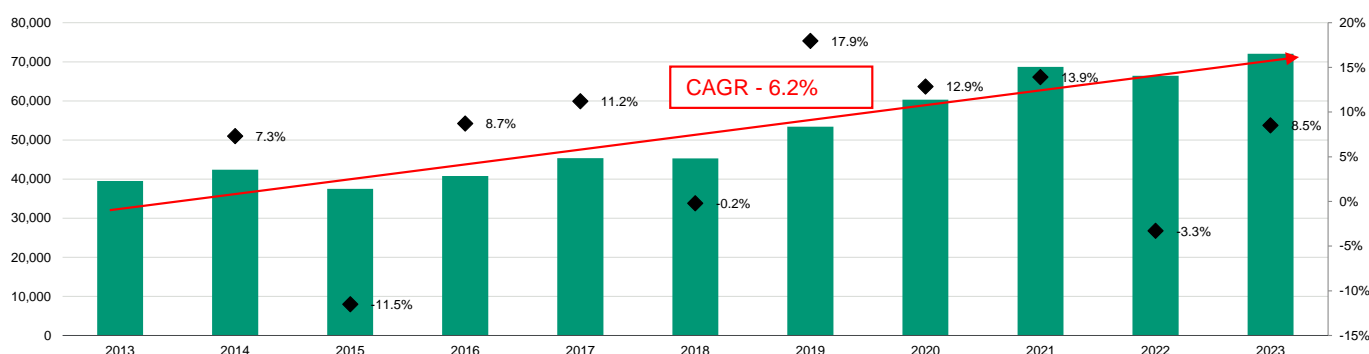
In the context of mining, Asset Retirement Obligations are legal and financial obligations that arise because of the need for environmental reclamation and site restoration once mining ceases. More specifically, this refers to requirements for companies to restore land and ecosystems to their original state, or a state acceptable to regulators.

The sum of the long-term (noncurrent) AROs of the 24 largest rated mining companies we examined in this report increased materially in the last decade, from about \$40 billion in 2013 to about \$72 billion at the end of FY2023 (see Exhibit 1).

Exhibit 1

Noncurrent AROs of 24 rated mining companies increased by 82% over the last 10 years to \$72 billion in FY2023

Noncurrent AROs (\$ millions) and y-o-y changes (%)



Source: FactSet, Company data, Moody's Ratings

Year-over-year increases in AROs ranged from 7.3% to 17.9% during this period. Acquisitions contributed to rising AROs, with buyers taking on reclamation liabilities associated with the acquired assets. The exceptions were declines in 2015, 2018 and 2022. These decreases were driven largely by asset divestitures, with sellers removing the related provisions from their balance sheets, and higher assumed nominal discount rates. For example, in 2022, higher discount rates lowered [Teck Resources Limited's](#) (Baa3 stable) decommissioning and restoration provisions by about CAD1.5 billion, while an increase in the assumed discount rate of the AROs in Canada, among other factors, lowered Vale's liability by \$870 million.

Mining companies estimate the costs associated with future site restoration and reclamation, discount them back to present value and recognize these costs as a balance sheet liability when the obligation is incurred or sufficient information becomes available to reasonably estimate the fair value. This estimate includes: the expected method for decommissioning, cost, timing of the cash flow and risk-adjusted discount rate. These could include costs for activities such as: structure removal, like closing and decommissioning tailings

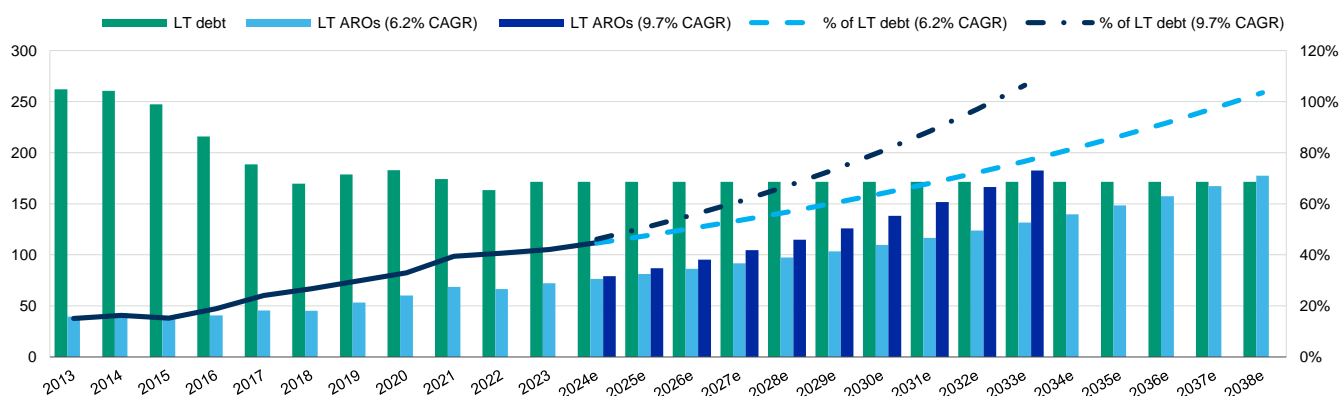
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dams; environmental remediation of disturbed areas; treatment and monitoring of contaminated water; and reestablishing vegetation. The initial estimates could change over time, with changes in regulations, life-of-mine plans or estimated costs. As mining continues, further environmental disturbance leads to higher AROs.

To reach \$72 billion, we estimate noncurrent AROs of the 24 mining companies increased at the compounded annual growth rate (CAGR) of 6.2% during 2013-2023. We believe that total would be materially higher, if not for asset divestitures that took obligations off miners' books. During this period, these companies benefited from strong commodity prices and cash flow generation that boosted liquidity and allowed significant debt reduction. The companies repaired their balance sheets through asset sales, more disciplined capital allocation, and cost cutting. The combination of higher AROs and lower debt resulted in total noncurrent AROs for the companies growing from 15% of total long-term reported debt in 2013 to 42% in 2023. Assuming the aforementioned 10-year CAGR of 6.2%, and keeping the 2023 debt amount constant, we estimate long-term AROs of these companies will exceed their total reported long-term debt by 2038. However, if we assume the 5-year (2018-2023) CAGR of about 9.7%, long-term AROs will outgrow their collective long-term debt load by 2033 (see Exhibit 2), or earlier if we include short-term (current) AROs. Total AROs, including current provisions, stood at \$78 billion at the end of FY2023.

Exhibit 2

Noncurrent AROs of 24 rated mining companies could exceed their collective gross debt by 2033 (\$ billions)



Note: Anglo American, AngloGold Ashanti, Barrick Gold, BHP Group, Fortescue Metals, Freeport-McMoRan, Glencore, Gold Fields, Newcrest Mining, Newmont, Peabody Energy, Rio Tinto, Southern Copper, Teck Resources, Vale SA., Vedanta Resources, Codelco, Alcoa, Kinross Gold, Norsk Hydro, South32, Cleveland-Cliffs, Agnico Eagle Mines, ArcelorMittal SA
 Source: FactSet, Company data, Moody's Ratings

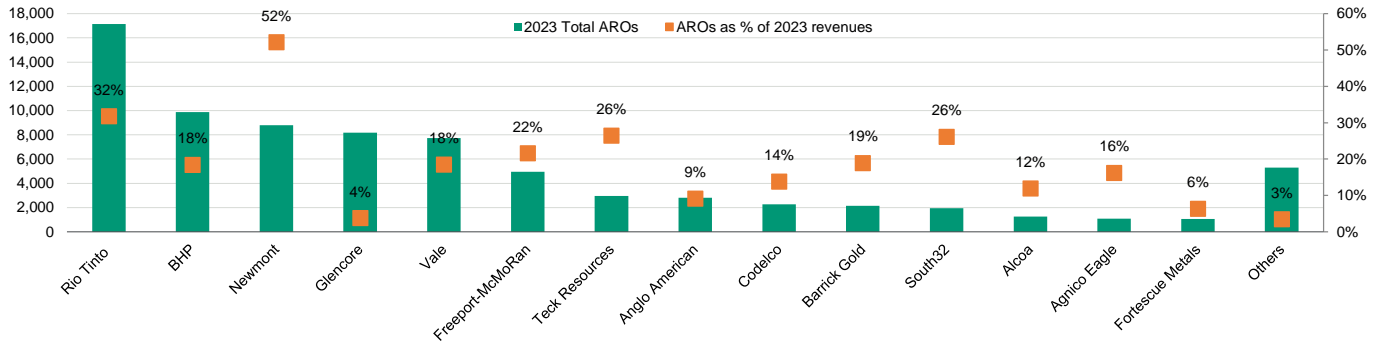
As of fiscal year-end 2023, Rio Tinto had the largest provision for AROs (current and noncurrent liabilities) among the 24 companies, followed by BHP, Newmont, Glencore and Vale. The high figures broadly indicate significant future obligations related to asset retirement, which, if not adequately planned for, could materially affect cash flows and financial stability. At the same time, they also typically indicate a company has substantial, long-lived assets that produce significant revenue — like diversified miners Rio Tinto, BHP, Glencore and Vale.

To put it into context, Rio Tinto's 2023 AROs represent 32% of its revenue (see Exhibit 3). For BHP and Vale, it is 18%. The low ratio of 4% for Glencore reflects its Marketing Activities segment, which accounted for 76% of its \$218 billion in revenue. Excluding this segment, Glencore's AROs as a percentage of revenue from its Industrial Activities segment rise to 14%, more in line with its peers. Newmont, a gold mining company, has third-largest AROs, despite its materially lower revenue base compared to diversified miners, which translates into the highest ratio of the AROs-to-revenue — 52%. We annualized Newmont's first half 2024 revenue to reflect its acquisition of Newcrest Mining. Newmont's \$8.8 billion of reclamation and remediation obligations include \$401 million from Newcrest and \$4.8 billion of liabilities related to the Yanacocha mine in Peru, which is being assessed for potential closure.

Exhibit 3

Most mining companies' asset retirement liabilities below 30% of revenue

Total asset retirement liabilities by company and as a percentage of revenue (\$ millions)



Note: Annualized H1 2024 revenue for Newmont
 Source: FactSet, Company data, Moody's Ratings

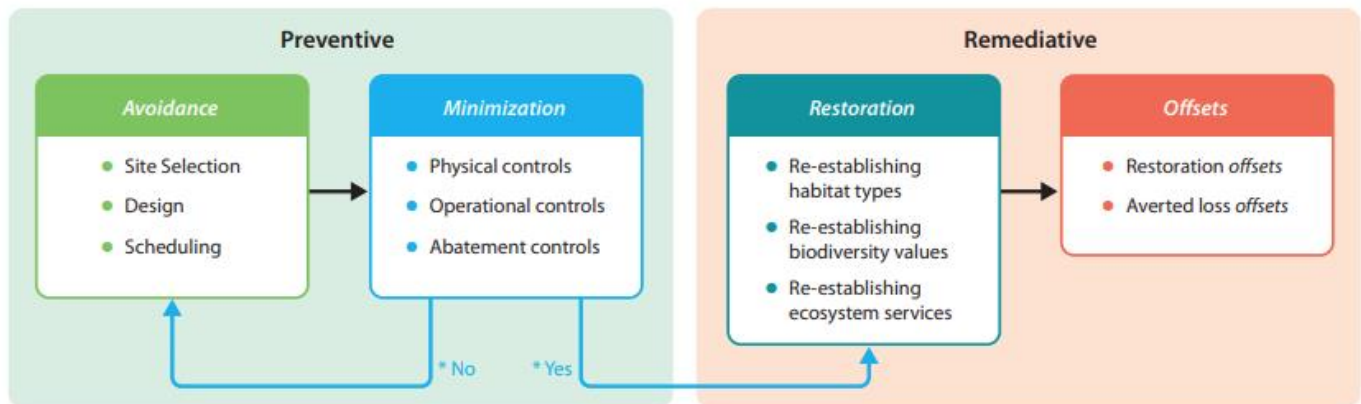
More land disturbance, cost inflation and focus on biodiversity push obligations higher

Mining is an extractive industry that inherently requires disturbance of large tracts of land. To manage the current and future exposure, including biodiversity and asset retirement obligations, most mining companies implement the Mitigation Hierarchy framework (see Exhibit 4). This systematic approach aims to avoid, minimize, restore and offset environmental damage, in that order. Companies initially aim to avoid any disturbance by selecting less-sensitive sites for development or modifying project designs. If avoidance is not possible, they aim to minimize the impact, by using cleaner technologies or limiting the operational footprint. The next step is restoration, where companies take actions to rehabilitate land through efforts like replanting vegetation. Finally, if there are still residual disturbances, the company will seek to offset these by creating or improving other habitats or investing in conservation.

Exhibit 4

Most mining companies implement the Mitigation Hierarchy framework to limit the negative impacts on biodiversity

Figure 1 Schematic diagram showing the implementation of the mitigation hierarchy



* Can potential impacts be managed adequately through remediate measures?

Source: ICMM

Most mining companies perform progressive rehabilitation, trying to rehabilitate portions of the operating mine site or areas where activity ended (mined out pits, tailings dams, uneconomic stockpiles) and performing work on closed or legacy mine sites while other mining operations continue. This can mitigate environmental impact by minimizing the area of land disturbed, reducing the time needed for ecosystem recovery, while also lowering companies' overall environmental liability.

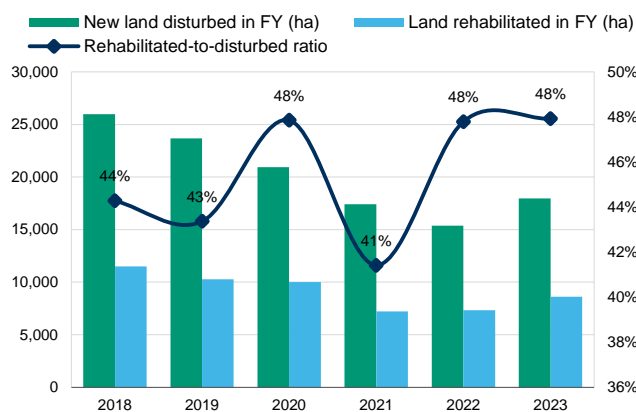
Land disturbance and rehabilitation disclosures are fairly new and remain inconsistent across companies and jurisdictions, but the quality of the reported data improved over the last few years with many companies disclosing land use data annually. The annual land

disturbance, amount of land rehabilitated and the ratio of the two is available for 13 mining companies (out of 24) that disclosed these specific GRI MM1 metrics (see Exhibit 5). As shown, despite adopting the mitigation hierarchy approach and progressively rehabilitating affected areas, mining companies, on average, rehabilitate less than half the land they disturb. These rehabilitation-to-disturbance ratios change materially from year to year and vary among miners. Many companies rehabilitate only a modest portion of the annually disturbed land because concurrent rehabilitation is mostly nonmandatory and most operations are long-lived with most spending forecast to occur far in the future. Still, there are companies like Alcoa that set goal to maintain a ratio of rehabilitation area to mine disturbance area of 1:1 or better. In 2023, Alcoa achieved a 1.30 rehabilitation-to-disturbance ratio and we estimate that during 2018-2023, Alcoa rehabilitated 100% of the area it disturbed.

Overall, the "total amount of land disturbed that is yet to be rehabilitated," by 15 companies (out of 24) for which this particular GRI MM1 metric was available, rose to about 1.05 million hectares at the end of 2023 from 1.02 million hectares in 2018 (see Exhibit 6). The y-o-y declines in 2019 and 2022 largely reflect asset sales to companies outside of the scope of this study.

Exhibit 5

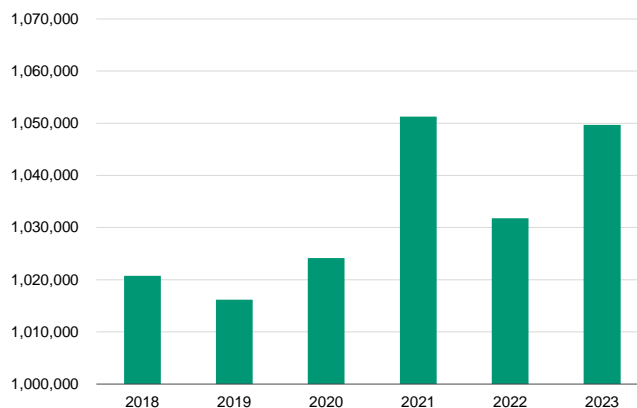
Mining companies, on average, annually rehabilitate less than half of the disturbed land (ha - hectares)



Source: Company data, Moody's Ratings

Exhibit 6

Total land disturbed that is yet to be rehabilitated (ha - hectares)



Source: Company data, Moody's Ratings

Feasibility of progressive rehabilitation can be constrained by the mine plan. For instance, an open pit mine might require the entire deposit to be mined or open-pit mining of a specific area of the deposit to cease before rehabilitation starts. Also, rehabilitation efforts require significant resources. Mining companies, particularly those under financial pressure, may prioritize revenue generating extraction over rehabilitation. Benefits of rehabilitation (e.g., improved ecosystem services, better local communities relations) may not be directly monetizable or may only be realized in the long term, which can lead to underinvestment. Finally, while many jurisdictions have laws requiring miners to rehabilitate disturbed lands, enforcement and effectiveness of these regulations varies.

Changes in regulations, significant industry cost inflation, specifically labor, input materials and equipment, and greater investor and societal focus on biodiversity and natural capital resulted in an accelerated rise in reclamation liabilities for companies. Many governments are tightening regulations to promote sustainable mining practices, which means increased compliance costs. For instance:

- » After the 2019 Brumadinho dam disaster in Brazil, the government tightened regulations on tailings dams, increasing liabilities for companies including Vale, which took additional decommissioning costs for upstream tailings dams.
- » Teck cited higher decommissioning and restoration provisions resulting from a directive by Environment and Climate Change Canada in October 2020 requiring additional measures to address water quality and fish habitat impacts. We note that these AROs were related to the coal assets that have since been sold to Glencore.
- » Newmont's increased reclamation liabilities at Yanacocha in Peru were driven in a large part by modified water quality standards for mining.

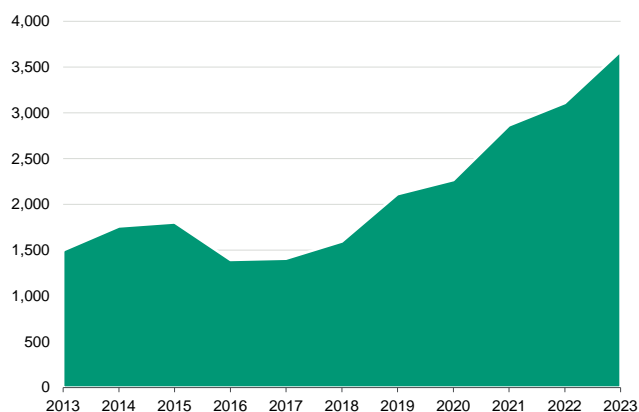
- » Barrick's environmental rehabilitation obligations rose \$850 million in 2017, in part because of new requirements related to water treatment as well.

Spending on AROs, financial guarantees rising and likely to grow further

Reclamation and environmental remediation payments fluctuate year to year and are difficult to predict because of the specific nature of each obligation and miners' varying ability and willingness to perform concurrent rehabilitation. The 24 mining companies we reviewed spent \$1.4 billion — \$1.8 billion annually on AROs during the 2013-2018 period (see Exhibit 7). However, since 2018, their ARO payments more than doubled to about \$3.7 billion in FY2023 — a 5-year CAGR of 18.2%. As a percentage of cash flow from operations (before spending on AROs), annual payments were 1.5%-2.3% before rising to 3.2% in 2023 (see Exhibit 8). This reflects the sharp increase in ARO expenditures and normalization of operating cash flow in 2023 that was very strong in 2021-2022 when prices for several commodities hit records.

Exhibit 7

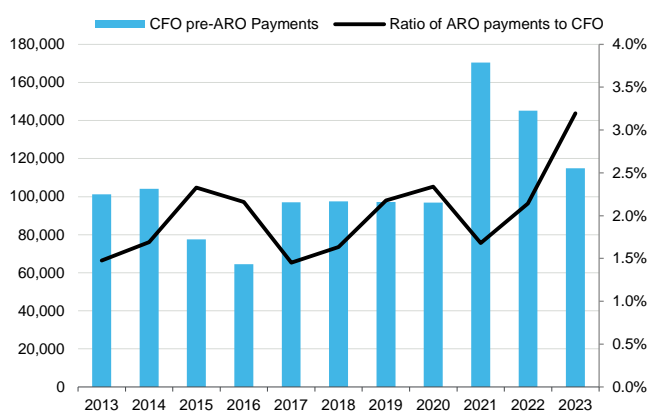
Cash expenditures on AROs rose sharply since 2018 (\$ millions)



Source: Company data, Moody's Ratings

Exhibit 8

Miners have substantial financial capacity, but are putting more operating cash flow toward ARO payments (\$ millions)



Source: Company data, Moody's Ratings

We expect the ARO payments to keep climbing. For example, Newmont expects to spend about \$600 million in 2024 and \$700 million in 2025, largely on construction of new water treatment plants mandated by Peru. These amounts are more than double what it spent in 2022 and 2023. The company expects reclamation spending to fall in 2026, however if it decides to forgo development of the Yanacocha Sulfides project, some closure activity could be accelerated, leading to higher ARO-related spending. Alcoa made \$203 million in environmental and ARO payments in 2023 and forecasts spending will rise to \$295 million this year. Through year-end 2023, Rio Tinto projects cash outflow for close-down and restoration/environmental cleanup provisions within one-year of about \$1.5 billion (current portion of the total liability), more than the \$1.14 billion balance at year-end 2022.

On top of cash spending, mining companies must provide financial guarantees to ensure adherence to environmental regulations, rehabilitation commitments and to fulfill local permitting requirements. The goal is to protect the public and environment if a company fails to fulfill reclamation obligations or goes bankrupt. The form of financial assurance — reclamation bonds, surety bonds, time deposits, letters of credit, environmental rehabilitation trusts and cash reserves — can vary significantly. Still, the amounts are often material and could affect a company's liquidity and tie up capital that could go to operations or expansion. For example, [Peabody Energy Corporation's](#) (B1 stable) reclamation bonding requirements exceeded \$1 billion at the end of 2023 and are supported by about \$825 million of restricted cash and other collateral. Peabody is one of the [coal companies with significant long-term financial burdens](#), including asset-retirement obligations, that weigh on their credit quality.

Credit risks vary by company and are mostly low for now, but could escalate

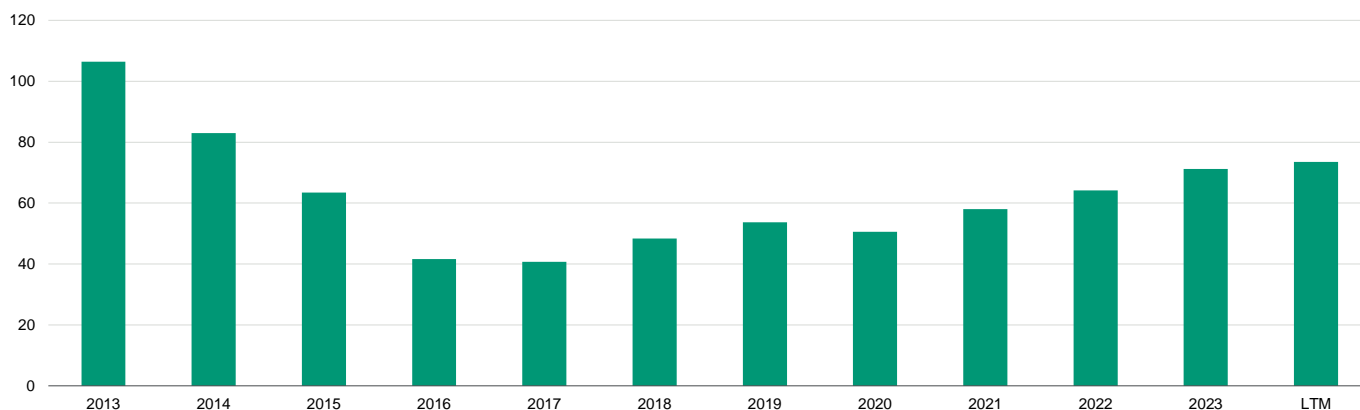
Near-term credit risks for most mining companies we evaluated are low given the long-dated nature of their AROs and ability to generate healthy operating cash flow to fund concurrent rehabilitation, while providing financial assurance to regulators. The risks vary

by company and should become clearer over time, since reclamation and remediation requirements are typically spread over many years. For companies operating assets with long life-of-mine plans (LOMs), like iron ore and copper mines, most costs will be incurred after 15-20 years.

In time, rising dependence of mining companies on the environment, as well as growing spending on AROs, financial guarantees and cash reserves, could reduce cash flow and liquidity unless commodity prices climb and stay elevated. This challenge comes at a time when miners are increasing capex (see Exhibit 9) to sustain production amid declining ore grades, invest in growth projects and decarbonize operations. For example, Rio Tinto expects to spend \$5 billion - \$6 billion on decarbonization projects up to 2030.

Exhibit 9

After many years of relative underinvestment, mining capex is growing again (\$ billions)



Note: Total capex of 24 mining companies

Source: Company data, Moody's Ratings

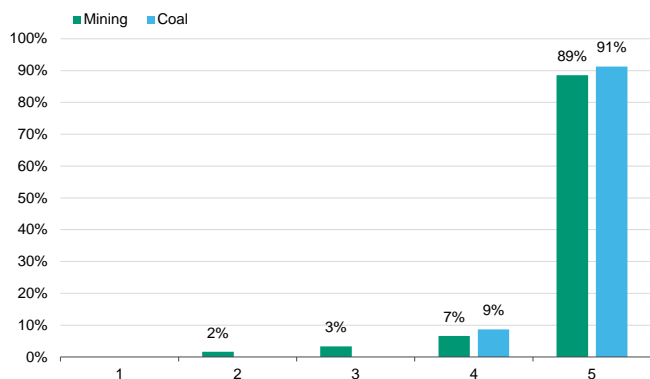
While miners spend a lot annually on reclamation, the amount is substantially lower than that required when a mine nears closure. Large mines with long LOMs offer substantial flexibility to mining companies allowing them to re-sequence mining activities or temporarily defer capex, particularly when commodity prices fall. Companies with shorter LOMs, like gold miners, must continuously reinvest to extend the life of a mine or face having to fulfill closure obligations like many coal companies are doing currently.

Large mining companies, by virtue of their diversified portfolios across multiple metals and jurisdictions, are inherently more able to fund annual reclamation spending and provide financial guarantees than smaller counterparts. This diversification not only mitigates the risk from fluctuations in individual commodity prices, but ensures a steady stream of cash flow. For instance, if the price of one metal drops, more diversified miners can rely on revenue from other assets, maintaining liquidity and thereby their ability to fulfill environmental obligations. Smaller miners, limited to a few assets or a single commodity, are more vulnerable to market volatility. This lack of diversification could also constrain capacity to fund necessary reclamation activities or provide financial guarantees crucial for minimizing the environmental impact and meeting regulatory requirements.

While we do not consider reclamation obligations to be debtlike liabilities, in part, because they are typically spread out over many years, our analysis takes this exposure into account in our assessment of [natural capital exposure](#), as per our [ESG methodology](#). For this sector, that stems from material reliance on the natural environment and considerations around ecosystem damage that could lead to lower revenue, consumer backlash, increased environmental compliance costs and regulatory penalties.

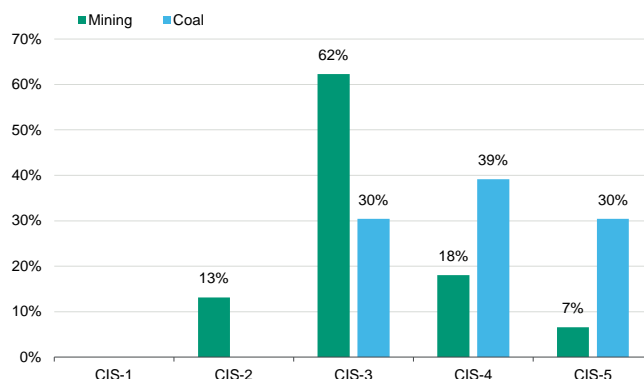
The long-term significance of these liabilities and increasing cash outflows, which largely but not exclusively inform our assessment of natural capital exposure for the mining sector, is clear from our [environmental heat map](#). In it, coal and metal mining are the only two sectors with very high exposure to natural capital. While the heat map looks at sector exposure, our proprietary Issuer Profile Scores (IPS) look at exposure at company level and incorporate material mitigating or strengthening factors related to those specific exposures. They show limited differentiation among rated coal and metal mining companies, with 91% and 89%, respectively, having very high credit exposure to natural capital considerations (see Exhibit 10).

Exhibit 10
About 90% of mining and coal companies have very high exposure to natural capital risk



Note: 1 — Material Benefit, 2 — Not Material, 3 — Moderate, 4 — High, 5 — Very High
 Source: *Moody's Ratings*

Exhibit 11
But the credit impact of ESG considerations on the credit ratings is far more pronounced among coal companies



Note: CIS-1 — Positive, CIS-2 — Not Material, CIS-3 — Limited, CIS-4 — Discernible, CIS-5 — Pronounced
 Source: *Moody's Ratings*

Our proprietary Credit Impact Scores (CIS), that indicate the extent to which the rating of an entity or transaction would be different if there were no exposure to ESG risks, do show a differentiation among coal mining and metal mining companies. For 69% of the coal mining sector, ESG considerations have a discernible (4) or pronounced (5) effect on the current rating, lower than it would have been if ESG risks did not exist. Natural capital considerations around abandonment liabilities, the management of end-of-cycle assets and financial liabilities are among the considerations that inform the assessment and could influence the rating. On the other hand, for the mining and metals sector, only 25% of companies have those CIS scores, with 62% of companies having CIS scores of 3 (see Exhibit 11), indicating ESG considerations' influence on current ratings is limited, with potential for greater negative impact over time. At the same degree of natural capital exposure, this group will benefit from longer-lived assets, production profiles or financial flexibility.

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