



Thematic Bonds Can Help Increase Investment in Responsible Mining of Critical Minerals

By **Dr. Gautam Jain, Dr. Tom Moerenhout** and **Preetha Jenarthan**

Without an increase in the supply of critical minerals, there is no pathway to meet the Paris Agreement's 1.5°C temperature rise limit, as they are essential components of many clean energy technologies ranging from solar panels to wind turbines to electric vehicles and storage batteries. A key challenge to increasing supply to meet expected demand growth from the energy transition has been an underinvestment in the mining and exploration of critical minerals over many years.¹ Elevated price volatility of critical minerals in combination with the long lead times of mining projects is a headwind to new investments,² as are potential reputational risks from the negative environmental and social impacts of the mining industry.³

One option to help bridge some of the investment gap in critical minerals mining by providing long-term stable financing while encouraging responsible mining is thematic bonds, a relatively new and thriving asset class that has proven useful for funding projects based on specific investment themes such as mitigating the impacts of climate change and meeting sustainable development goals.⁴

This commentary explains the need for more consistent investments in critical minerals and evaluates how mining companies have used thematic bonds so far. It then discusses opportunities for expanding issuance of these bonds and suggests new features that could be added to further align them with investor interests while helping solidify the long-term viability of the critical minerals mining industry. The authors find that there is a significant potential for thematic bonds to help expand investments in the responsible mining of critical minerals for the energy transition.

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Need for More Stable Investments

To meet energy transition goals, new investments of almost \$800 billion are needed in copper, lithium, nickel, cobalt, and rare earth metals by 2040, which is roughly an *additional* \$50 billion per year.⁵ This implies that the pace of investments in these five metals needs to more than double, as the capital expenditures by major mining companies in all non-ferrous metals (i.e., including aluminum, zinc, etc.) amounted to just over \$50 billion in 2023.⁶ To be clear, investments have been increasing in recent years, but there has been a slowdown from a growth of 30 percent in 2022 to 10 percent in 2023.⁷

Even if the recent pickup in investments were to continue over the next couple of years, the market is expected to become tight for certain key critical minerals like lithium and copper, as demand will likely outpace supply. When that happens, prices for these minerals will likely go up, which would then, in theory, support investments. However, because of long lead times between investment decisions and production in the mining sector, additional supply could come to the market only after slowing down the energy transition first.⁸ More recently, though, prices of critical minerals have been languishing as a result of Chinese overcapacity in combination with lower-than-expected EV sales, which are important factors behind the deceleration of investment growth from 2022 to 2023.⁹ The lack of price stability impacts the prospects of future investments, as mining is a capital-intensive industry and, as noted, the time to develop a new mine is long, exceeding two decades on average.¹⁰ But if a key goal is to diversify supply chains to improve resilience and lower the geopolitical threat from quasi-monopolies, such investments will be needed.

Complicating the investment picture, the mining industry garners criticisms for its high greenhouse gas emissions, excessive water use, human rights violations, and harmful impacts on biodiversity and local communities.¹¹ Despite the crucial role of critical minerals in the green transition, investors with a lower tolerance for these impacts demand accountability in environmental and social practices.¹²

To address the investment gap resulting from these issues, financial instruments that can encourage improvements in sustainable and responsible mining—along with supporting junior miners who will play an important role in balancing markets—can be effective. One such instrument is thematic bonds, which can help mining companies tap into a new and growing pool of investors managing sustainability-focused funds.¹³ There is also an increasing number of institutional investors without specific environmental, social, and governance (ESG) mandates that are incorporating sustainability considerations in their investment decisions.¹⁴



Limited Role of Thematic Bonds in Mining Thus Far

After a slow start when the first such bond was issued in 2007,¹⁵ the thematic bonds asset class started growing rapidly from 2015 onward after “green bond principles” were proposed that considerably lowered greenwashing risks. Based on Bloomberg data, over \$4.5 trillion of such bonds have been issued through Q1 2024, with the asset class expected to continue expanding.¹⁶

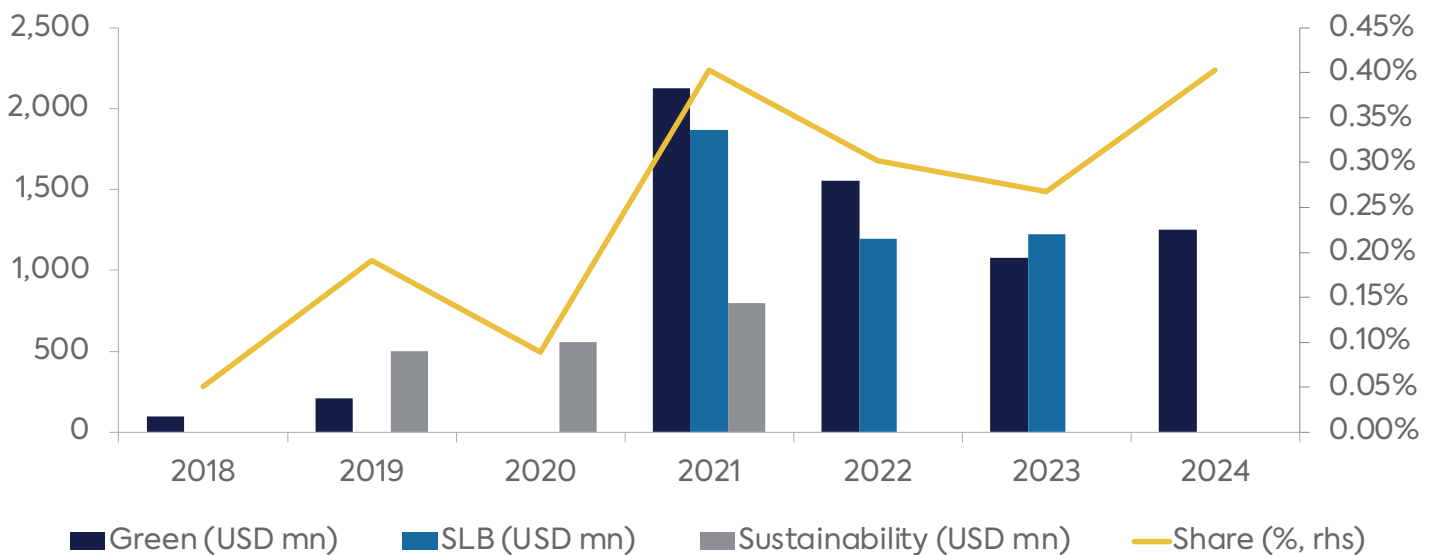
Thematic bonds are usually divided into two broad categories: use-of-proceeds (UoP) bonds and key performance indicator (KPI) bonds.¹⁷ As the name of the former suggests, funds raised through UoP bonds are ring-fenced for specific projects and, within this category, bonds are further classified based on the type of projects: green bond proceeds are directed toward environmental sustainability projects, social bonds target projects based on specific social issues, and sustainability bonds cover both environmental and social projects.

The proceeds of KPI bonds—the most common type of which are sustainability-linked bonds (SLBs)—are not tied to any specific projects, but the issuer is expected to meet prespecified objectives following the bond sale. And if the targets are not met, typically there is a penalty in the form of an increase in interest payments.

Mining companies have not been active borrowers in the thematic bond market, which is not surprising given the mining industry often generates negative impacts on the environment due to high carbon emissions, contamination of soil, excessive use of water, and loss of biodiversity. However, the mining of critical minerals is necessary to lower the likelihood and severity of climate change impacts. Issuing thematic bonds can help raise financing for companies that produce critical minerals for the energy transition while simultaneously lowering their environmental and social impacts.

Just under \$12.5 billion of thematic bonds have been issued by the mining industry through Q1 2024 (see Figure 1), with miners of critical minerals representing a tiny share of that. Many mining companies are diversified producers of metals that are not primarily linked to the energy transition, and several existing bonds do not specify that they will only be intended for investment in the mining of critical minerals for the energy transition. By bond type, mining companies have issued \$6.3 billion of green bonds, \$4.3 billion of SLBs, and \$1.8 billion of sustainability bonds. Thematic bonds from mining companies make up under 0.3 percent of the overall market for such bonds.

Figure 1: Annual amount and share of thematic bonds issued by mining companies



Data Source: Bloomberg; as of March 2024.

Besides bonds, a few mining companies that produce critical minerals have sustainable loans outstanding. As of Q1 2024, these companies had a total of \$26.2 billion in sustainability-purpose loan facilities, including term loans and revolving credit facilities (RCF).¹⁸ RCFs are unlikely to be fully drawn at all times because they serve as a liquidity backstop option and generally carry higher interest rates than fixed-term loans, in exchange for the flexibility and convenience they provide. As RCFs are not fully drawn, the impact of any penalty for not meeting sustainability targets attached to them would be low, since the commitment fee is typically a small percentage of the overall interest rate. This practice can raise greenwashing concerns among investors, exacerbated by only a small minority of loans opting for an external ESG score.¹⁹

As only 9 of the top 25 companies that produce critical minerals in terms of market capitalization have borrowed using a thematic bond or loan (see Table A-1 in the appendix), the potential for the use of these instruments to expand further is significant.

Expanding the Use of Thematic Bonds

Despite the limited issuance thus far, thematic bonds could fit well as a source of funding for producing critical minerals. As discussed earlier, high capital requirements along with the long lead times of mining projects make them ideally suited to be financed with bond issuances. Thematic bonds, in particular, could directly address the negative environmental and social impacts of



these companies. Doing so would enhance the reputation and improve the credibility of mining companies, leading to a stronger commitment to the companies' business models from some stakeholders and investors.²⁰ Moreover, it would allow these companies to access new investors with sustainability mandates, especially given the rapid growth of funds focused on ESG factors in recent years. Open-end funds and exchange-traded funds focused on sustainability, impact, or ESG factors, which are a subset of these funds, have grown from around \$1 trillion at the end of Q4 2019 to \$3 trillion at the end of Q1 2024, almost a three-fold increase in just over four years.²¹

Many companies now issue sustainability reports that disclose information about their operational ESG risks and targets, which in the case of mining companies encompass the areas mentioned above.²² While a step in the right direction in terms of promoting transparency and sustainability, impact measurements and reporting have not always meant progress on these fronts,²³ partly because they do not entail any binding commitments. In contrast, while the underlying principles of thematic bonds are also not binding, not meeting the commitments made as part of the bond issuance can prove to be costly for a company, by leading to an increase in borrowing costs as the bond may be delisted from an exchange and portfolio managers may exit from investments related to the issuer.²⁴ As such, these instruments may make investing in the sector more palatable to a broader set of institutional investors and asset managers who don't have specific sustainability mandates but track the carbon footprint and social impacts of their portfolios.

Despite the benefits, issuing thematic bonds is not a trivial decision for a company due to the complexities and costs involved.²⁵ Green bonds are expected to follow green bond principles, which dictate earmarking the bond proceeds for the types of projects specified before issuance. Processes need to be set up for selecting and evaluating the projects along with managing the proceeds and reporting on the progress of the projects on an annual basis. For sustainability-linked bonds, KPIs and sustainability performance targets need to be set along with a process for reporting and verification of targets. Additionally, the interest rate of these bonds may be adjusted higher if the targets are not met. For both UoP and KPI bonds, pre-issuance second-party opinions and post-issuance third-party verifications are recommended, which can be costly.

For a company that has decided the effort and costs are worthwhile, the decision between green or sustainability bonds and sustainability-linked bonds boils down to whether it's possible to identify specific projects that can be funded so that the bond reaches a "benchmark size"²⁶ versus whether it prefers to keep the flexibility of deciding on the projects as long as certain predetermined targets are met. Investors generally perceive a higher greenwashing risk in sustainability-linked bonds than in use-of-proceeds bonds,²⁷ and are therefore more likely to pay a premium for the latter.²⁸

Lessons from Mining Companies Issuing Thematic Bonds

For mining companies that have yet to issue a thematic bond, Tables A-2 and A-3 in the appendix provide a few best-practice examples of issuances used to access funding while improving the environmental performance and social impact of extracting, processing, and refining minerals. The criteria for selecting the mining companies reviewed in this study were that they mine critical minerals, have a publicly accessible financing framework, and have issued thematic bonds totaling at least \$200 million.

The tables help identify characteristics of the metals and mining companies that have successfully tapped the thematic bond market—for example, the inclusion of medium-term (2030) and long-term carbon-neutral or net-zero goals. Features of the bonds issued, such as the types of projects targeted and KPIs used, are also included.

Green and sustainability bond issuances have focused primarily on reducing greenhouse gas emissions and better water management, although sustainability bonds also cover employment and empowerment for vulnerable populations, via projects that encompass (Table A-2):

- Renewable energy
- Pollution prevention and control
- Energy efficiency improvements in extraction and processing
- Circular economy and recycling
- Green hydrogen and ammonia
- Energy storage
- Clean transportation
- Sustainable water and wastewater management
- Employment generation, socioeconomic advancement, and empowerment

Use-of-proceeds financing can be very powerful. For example, a lot of innovations are already available to miners to lower environmental impacts, but access to funding is needed to cover the additional expenses relative to more environmentally harmful mining methods. Thematic bonds can help access financing for implementing these innovations, as they attract impact-focused investors



by including commitments to improve mining methods. Several miners are already integrating renewable energy into their mining and processing activities, including Alcoa and Anglo-American, among several others (Tables A-2 and A-3). It is also possible to electrify some of the transport or use sustainable fuels to rely less on diesel in mining operations, as is the case for Boliden, Fortescue, and LKAB (Table A-2).²⁹ Regarding water consumption, it is possible to desalinate and pump water to the mine site rather than use groundwater.³⁰ Additionally, used water can be cleaned, recycled, and reused in mining operations, as has been done by MP Materials and Posco, among others (Table A-2).³¹

Similarly, several techniques exist to reduce pollution and risk when it comes to waste and tailings. For example, rather than using tailing dams to store toxic mining waste, which have caused environmental catastrophes in the past, miners can dry-stack the tailings, which is often safer and cleaner. Examples of companies using these techniques include Anglo-American and Fortescue (Tables A-2 and A-3).³² All these activities, however, add costs and complexities that miners are hesitant to undertake. Issuing a green or sustainable bond can help finance these activities that can support the industry in the long run.

Just as importantly, use-of-proceeds bonds can categorically exclude certain types of projects (Table A-2). Some exclusions cover fossil fuel and nuclear energy generation, large-scale hydropower projects, hydrogen from nonrenewable electricity sources, and potentially environmentally harmful resource extraction. Exclusions for some companies, such as SQM (Table A-2), go beyond environmental categories and cover violations of human rights, use of child labor, and trade in conflict minerals.³³

If ring-fencing funds in use-of-proceeds bonds for specific projects is unmanageable for some companies, KPIs in sustainability-linked bonds can be another way to improve performance. In addition to an emphasis on emissions reduction and more efficient water use, some SLBs include KPIs covering social factors. Typical KPIs for these bonds issued by metals and mining companies include (Table A-3):

- Scope 1 and 2 greenhouse gas emissions reduction
- Energy efficiency metrics
- Pollution prevention and control
- Increased recycled output
- Clean transportation
- Fresh water abstraction in water-scarce areas

- Share of suppliers and customers that have decarbonization targets consistent with the Paris Agreement
- Number of jobs supported offsite for every job onsite
- Percentage of women in senior leadership roles

Potential New Thematic Bond Features for the Mining Industry

Since investments in critical minerals need to double from current levels to meet net-zero goals, it is important that capital raised for this purpose via both use-of-proceeds and KPI bonds is indeed used to support the production of key minerals for the energy transition and not for other metals. Doing so would strengthen the bond's green credentials and, as a result, enlarge the pool of investors by potentially also pulling in those focused on specific environmental outcomes via impact investing.³⁴ Several companies, including those reviewed in this study, produce both critical minerals and other metals. One way for investors to ensure capital is flowing to critical minerals projects could be including a KPI, even for a use-of-proceeds bond,³⁵ linked specifically to an increase in the mining, production, or processing of one or more critical minerals on the list of the US Department of the Interior.³⁶

Other factors related to biodiversity conservation could be incorporated via KPIs, which has not been the case so far. Similarly, building on the idea of benefit sharing—which has been proposed to better integrate local and Indigenous communities in mining projects³⁷—another KPI could stipulate spending a percentage of the revenue on specified projects that benefit the local community, including Indigenous peoples. For water treatment and recycling, companies could commit to having such facilities on-site. These features could support the issuance of such bonds, since the demand for responsibly sourced critical minerals produced under robust labor and environmental standards is expected to remain strong.³⁸

Finally, sustainability frameworks developed by companies before issuing thematic bonds could explicitly bar the use of suboptimal tailing dam infrastructure, mining in high carbon sink areas and biodiversity hotspots, the development of new projects without published environmental and social impact assessments, and the disposal of mine waste in rivers and lakes.

Mining can happen a lot more responsibly than it currently is, but doing so incurs additional costs that mining companies struggle with, given the already high upfront expenses of new greenfield projects. Thematic bonds offer a path forward for balancing costs with investor interest in sustainable mining and the broader energy transition.



Appendix

Table A1: Sustainability debt strategy of the Top 25 critical minerals companies by market capitalization

| Company | Market Capitalization (USD bn) | Issued Any Sustainable Debt? | Loan Type | Sustainable Loan Facility (USD mn) | Sustainable Loans Outstanding (USD mn) | Bond Type | Total Thematic Bond Issuance Amount (USD mn) | Total Sustainable Debt Raised (USD mn) | Total Debt (USD mn) | Percentage of Sustainable Debt to Total |
|-------------------------|--------------------------------|------------------------------|-----------|------------------------------------|--|--------------------------|--|--|---------------------|---|
| BHP Group | \$144.3 | N | N/A | N/A | N/A | N/A | 0 | 0 | 22,404 | 0.0% |
| Rio Tinto | \$108.7 | N | N/A | N/A | N/A | N/A | 0 | 0 | 14,352 | 0.0% |
| Mitsubishi | \$97.1 | N | N/A | N/A | N/A | N/A | 0 | 0 | 49,113 | 0.0% |
| Southern Copper | \$80.3 | N | N/A | N/A | N/A | N/A | 0 | 0 | 7,030 | 0.0% |
| Itochu | \$68.4 | Y | Green | Unknown | Unknown | Green/ Sustainability | 500 | 500 | 30,212 | 1.7% |
| Glencore | \$65.2 | N | N/A | N/A | N/A | N/A | 0 | 0 | 32,241 | 0.0% |
| Freeport-McMoran | \$65.1 | N | N/A | N/A | N/A | N/A | 0 | 0 | 9,853 | 0.0% |
| Zijin Mining | \$55.3 | Y | N/A | N/A | N/A | Green | 46 | 46 | 20,155 | 0.2% |
| Vale | \$54.2 | N | N/A | N/A | N/A | N/A | 0 | 0 | 13,891 | 0.0% |
| Fortescue | \$50.6 | Y | N/A | N/A | N/A | Green | 800 | 800 | 5,318 | 15.0% |
| Saudi Arabian Mining Co | \$49.8 | N | N/A | N/A | N/A | N/A | 0 | 0 | 39,042 | 0.0% |
| Grupo Mexico | \$45.8 | N | N/A | N/A | N/A | N/A | 0 | 0 | 9,214 | 0.0% |
| Amman Mineral | \$39.7 | N | N/A | N/A | N/A | N/A | 0 | 0 | 3,215 | 0.0% |
| Newmont | \$39.1 | Y | SL RCF | 4,000 | 4,000 | SLB | 1,000 | 5,000 | 9,541 | 52.4% |
| Anglo American | \$29.9 | Y | SLL | 100 | 100 | SLB | 733 | 833 | 16,912 | 4.9% |
| Sumitomo | \$29.8 | Y | N/A | N/A | N/A | Green | 225 | 225 | 3,650 | 6.2% |
| Agnico Eagle | \$27.9 | N | N/A | N/A | N/A | N/A | 0 | 0 | 2,005 | 0.0% |
| Barrick Gold | \$27.3 | Y | SL RCF | 3,000 | 0 | N/A | 0 | 0 | 4,726 | 0.0% |
| POSCO Holdings | \$27.0 | Y | N/A | N/A | N/A | Green/ Sustainability | 1,349 | 1,349 | 26,895 | 5.0% |

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| Company | Market Capitalization (USD bn) | Issued Any Sustainable Debt? | Loan Type | Sustainable Loan Facility (USD mn) | Sustainable Loans Outstanding (USD mn) | Bond Type | Total Thematic Bond Issuance Amount (USD mn) | Total Sustainable Debt Raised (USD mn) | Total Debt (USD mn) | Percentage of Sustainable Debt to Total |
|------------------|--------------------------------|------------------------------|-----------|------------------------------------|--|-----------|--|--|---------------------|---|
| Norilsk Nickel | \$25.2 | N | N/A | N/A | N/A | N/A | 0 | 0 | 10,232 | 0.0% |
| Antofagasta | \$24.6 | Y | Green | 530 | 530 | N/A | 0 | 530 | 4,079 | 13.0% |
| Teck Resources | \$22.3 | Y | SL RCF | 4,000 | 0 | N/A | 0 | 0 | 7,595 | 0.0% |
| CMOC Group | \$22.2 | Y | SL RCF | 1,556 | 0 | Green/SLB | 204 | 204 | 54,463 | 0.4% |
| Franco-Nevada | \$22.1 | N | N/A | N/A | N/A | N/A | 0 | 0 | 0 | 0.0% |
| Wheaton Precious | \$20.4 | Y | SL RCF | 2,000 | 0 | N/A | 0 | 0 | 6 | 0.0% |

Note: Debt figures represent company and metal/mining subsidiaries only; SL RCF stands for sustainability-linked revolving credit facility; sustainable loan outstanding is the amount of loan facility drawn; data as of March 2024.

Source: Compilation of company and third-party reports.³⁹



Table A2: Relevant characteristics of use-of-proceeds bonds issued by a few key mining companies

| Categories | Alcoa | Boliden | Fortescue | Itochu | LKAB | MP Materials | Norsk Hydro | Novelis | SQM | POSCO |
|--|---------------------------------------|--|--------------------------------------|--------------------------------------|--|---------------------|--------------------------------------|--------------------------------------|---|---|
| General Information | | | | | | | | | | |
| Headquarter Country | United States | Sweden | Australia | Japan | Sweden | United States | Norway | United States | Chile | South Korea |
| Critical Minerals | Aluminum | Copper, nickel, silver, zinc, lead | Copper, lithium, rare earth elements | Copper, nickel, platinum | Rare earth elements | Rare earth elements | Aluminum | Aluminum | Boron, lithium | Lithium |
| Other Minerals/ Metals | None | Gold | Iron ore | Iron ore, coal, uranium | Iron ore | None | None | None | Potassium-bearing minerals | Iron ore, coal |
| ICMM Member | Yes | Yes | No | No | No | No | Yes | No | No | No |
| Long Term Climate Goals (Carbon Neutral)* | 2050 | 2050 | 2040: Net Zero for Scope 3 | 2050: Includes Scope 3 | 2045: Carbon-free products and processes | None | 2050 | 2050 | 2040: Carbon-neutral products | 2050 |
| Medium Term Climate Goals* | 2030: 50% intensity reduction vs 2015 | 2030: 40% absolute reduction vs 2021 and 30% for Scope 3 vs 2021 | 2030: Net zero Scope 1 and Scope 2 | 2030: 40% absolute reduction vs 2018 | 2030: 25% absolute reduction vs 2020 | None | 2030: 30% absolute reduction vs 2018 | 2026: 30% absolute reduction vs 2016 | 2030: Carbon neutral for lithium products | 2035: 30% absolute reduction vs 2017–2019 |
| Green/Sustainability Financing Framework | | | | | | | | | | |
| Specifies UoP Coverage to Critical Mineral Mining Activities | Yes | Yes | No | No | Yes | Yes | Yes | No | Yes | No |
| Applies to Bond and Loans | Yes | Yes | Yes | Yes | No (Bonds only) | Yes | Yes | No (Bonds only) | No (Bonds only) | Yes |
| Bonds: Total Amount Issued (USD mn) | 750 | 472 | 541 | 500 | 210 | 690 | None | 586 | 1,450 | 1,349 |
| Loans: Total Amount Secured (USD mn) | No | No | No | Yes, amount unknown | No | No | No | No | No | No |
| Annual Reporting | Yes, across all companies | | | | | | | | | |

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| Categories | Alcoa | Boliden | Fortescue | Itochu | LKAB | MP Materials | Norsk Hydro | Novelis | SQM | POSCO |
|------------------------------------|---|--|---|---------------------------------|---|--|---|----------------------------------|--|---|
| Second-Party Opinion | Yes (Sustainalytics) | Yes (Cicero) | Yes (ISS) | Yes (Vigeo Iris) | Yes (Cicero) | None | Yes (Cicero) | Yes (Sustainalytics) | Yes (ISS) | Yes (DNV) |
| Annual Post-Issuance Review | Limited assurance | Limited assurance | Limited assurance | Assurance | Limited assurance | Assurance | Limited assurance | Limited assurance | Limited assurance | No external audit |
| Use of Proceeds | | | | | | | | | | |
| Use of Proceeds 1 | Renewable energy (powering production) | Increase production capacity of low carbon zinc (utilizing renewable energy) | Renewable energy (powering production) | Renewable energy | Renewable energy (powering production) | Renewable energy | Manufacture and recycling of aluminum | Renewable energy | Lithium extraction and processing for EVs | Renewable energy |
| Use of Proceeds 2 | Circular economy: aluminum recycling | Energy efficiency | Energy efficiency | Energy efficiency | Energy-efficient products/ Circular economy | Energy efficiency | Hydropower (powering production) | Pollution prevention and control | Lithium extraction and processing for energy storage | Energy efficiency |
| Use of Proceeds 3 | Water and wastewater management (efficiency, recycling, reuse and conversation in operations) | Pollution prevention and control | Green hydrogen and ammonia, clean transportation, sustainable water management, and pollution control (dry stacking storage), | Healthcare | Pollution prevention and control | Sustainable water management (promote recycling) | Wind and solar power (powering production) | None | None | Sustainable water management (promote recycling and reuse of water) |
| Use of Proceeds 4 | Pollution prevention and control: manufacturing of low-carbon products | None | Employment generation, access to educational and vocational training, socioeconomic advancement and empowerment | Affordable basic infrastructure | Clean transportation, sustainable land use, green buildings, water purification, and waste management | Eco-efficient products | Energy storage, manufacture of batteries and hydrogen | None | None | Employment generation, socioeconomic advancement, and empowerment |

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| Categories | Alcoa | Boliden | Fortescue | Itochu | LKAB | MP Materials | Norsk Hydro | Novelis | SQM | POSCO |
|---------------------------------|------------------------|--|--|--|------|--|---|---------|---|---|
| Environmental Exclusions | Fossil fuel activities | Fossil fuel, nuclear energy generation | Fossil fuel, hydrogen from non-renewable electricity sources | Thermal power generation, mining, soy/palm oil value chain | None | None | Fossil and nuclear energy production, potentially environmentally harmful resource extraction | None | Fossil fuel, nuclear, large-scale hydro-power projects | Nuclear, does not exclude other fossil fuels |
| Other Exclusions | None | Gambling, tobacco | Other specific exclusions on a case-by-case basis linked to ESG factors. | None | None | Has exclusions, did not specify exclusion criteria | Weapons and defense, gambling, tobacco | None | Child labor, conflict minerals, military, specific product applications | Child and forced labor, Adult entertainment, Weapons and military contracting, alcohol, tobacco |

Notes: Mining companies selected for this analysis were chosen based on: engagement in critical mineral upstream and/or midstream mining activities, availability of a publicly accessible financing framework, and issuance of thematic bonds totaling more than \$200 million. *Reporting methods for climate targets vary; only a portion of the reported targets define the reduction targets by breaking down Scope 1, Scope 2, and Scope 3 emissions and specifying absolute or intensity emissions; ICMM stands for the International Council on Mining and Metals, an organization dedicated to a safe, fair, and sustainable mining and metals industry.

Source: Compilation of company and third-party reports.³⁹



Table A3: Relevant characteristics of KPI bonds issued by a few key mining companies

| Categories | Anglo American | Constellium | Eramet | Imerys | Newmont | Norsk Hydro |
|--|---|--|--|--|--|--------------------------------------|
| General Information | | | | | | |
| Headquarter Country | UK | France | France | France | United States | Norway |
| Critical Minerals | Copper, manganese, nickel | Aluminum (Constellium is a metal fabricator and does not mine bauxite, refine alumina, or smelt aluminium) | Ferronickel, lithium, manganese, and mineral sands (e.g. titanium, zircon) | Graphite, lithium | Copper, lead, silver, and zinc | Aluminum |
| Other Minerals/ Metals | Iron ore, coal, diamonds | None | Ilmenite, zircon | Bentonite, kaolin, perlite | Gold | None |
| ICMM Member | Yes | No | No | No | Yes | Yes |
| Long Term Climate Goals (Carbon Neutral)* | 2040: Scope 1 and Scope 2; reduce Scope 3 emissions by 50% | None | 2050 | None | 2050 | 2050 |
| Medium Term Climate Goals* | 2030: 30% absolute reduction vs 2016 & carbon neutral across eight sites. | 2030: Absolute reduction by 30% vs 2021 | 2035: 40% absolute reduction vs 2019 | 2030: 42% absolute reduction vs 2021 and 25% for Scope 3 vs 2021 | 2030: 32% absolute reduction vs 2018 and 30% for Scope 3 vs 2019 | 2030: 30% absolute reduction vs 2018 |
| Sustainability-Linked Financing Framework | | | | | | |
| Specifies KPI Coverage Related to Critical Mineral Mining Activities | Yes | No | No | No | No | Yes |
| Applies to Bond and Loans | Yes | No (Bonds only) | Yes | No (Bonds only) | No (Bonds only) | Yes |
| Bonds: Total Amount Issued (USD mn) | 733 | 866 | 541 | 549 | 1000 | 305 |
| Loans: Total Amount Secured (USD mn) | 100 | No | No | No | No | 200 |
| RCF Loans: Total Amount Secured (USD mn) | No | No | No | No | 3,000 (not issued under a framework) | 1,600 |

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| Categories | Anglo American | Constellium | Eramet | Imerys | Newmont | Norsk Hydro |
|--|--|--|--|--|---|--|
| Bond Characteristics | Step-up margin or premium payment amount for failure to meet SPTs or provide externally verified reporting | | | | | |
| Annual Reporting | Yes, across all companies | | | | | |
| Second-Party Opinion | Yes (ISS) | Yes (Sustainalytics) | Yes (Sustainalytics) | Yes (Cicero) | Yes (ISS) | Yes (Cicero) |
| Annual Post-Issuance Review | Limited assurance | Limited assurance | Limited assurance | Moderate assurance | Limited assurance | Limited assurance |
| Key Performance Indicators (KPIs) | | | | | | |
| KPI 1 | Absolute emissions reduction (Scope 1 and 2) | Intensity GHG emission (Scope 1 and 2) | Absolute emissions reduction (Scope 1 and 2) | Absolute emissions reduction (Scope 1 and 2) | Absolute and intensity emissions reduction (Scope 1 and 2) | Absolute emissions reduction (Scope 1 and 2) |
| KPI 2 | Fresh water abstraction in water scarce areas | Increased recycled aluminum output | Intensity GHG emission (Scope 1 and 2) | None | Absolute Scope 3 greenhouse gas emission | Post consumer scrap (PCS aluminum recycling capacity (tons)) |
| KPI 3 | Number of jobs supported off site for every job on site | None | Share of suppliers/customers by emissions having decarbonization targets consistent with the Paris Agreement | None | Percentage of women in senior leadership roles | None |
| Sustainability Performance Targets (SPTs) | | | | | | |
| SPT 1 | Reduce KPI 1 by 30% by 2030 vs 2016 baseline (via renewable energy powering operations) | Reduce KPI 1 by 25% by 2025 vs 2015 baseline (via renewable energy powering manufacturing) | Reduce KPI 1 by 40% by 2035 vs 2019 baseline (via renewable energy powering operations) | Reduce KPI 1 by 32.7% by 2028 and by 42% in 2030, vs 2021 baseline | Reduce KPI 1 by 32% by 2030 vs 2018 baseline (via renewable energy powering operations) | Reduce KPI 1 by 10% by 2025 and by 30% by 2030, vs 2018 baseline (via renewable energy powering productions) |
| SPT 2 | Reduce KPI 2 by 50% by 2030 vs 2015 baseline (via hydraulic dry stacking) | Increase KPI 2 by 10% by 2026 vs 2016 baseline | Reduce KPI 2 by 35% by 2025 and 40% by 2030, vs 2019 baseline | None | Reduce KPI 2 by 30% by 2030 vs 2019 baseline | Increase KPI 2 by 660,000 tons by 2025 |
| SPT 3 | Achieve KPI 3 by 5 by 2030 | None | Achieve 67% of KPI 3 by 2025 | None | Achieve 50% of KPI 3 by 2030 | None |

Notes: Mining companies selected for this analysis were chosen based on: engagement in critical mineral upstream and/or midstream mining activities, availability of a publicly accessible financing framework, and issuance of thematic bonds totaling more than \$200 million. *Reporting methods for climate targets vary; only a portion of the reported targets define the reduction targets by breaking down Scope 1, Scope 2, and Scope 3 emissions and specifying absolute or intensity emissions; ICMM stands for the International Council on Mining and Metals, an organization dedicated to a safe, fair, and sustainable mining and metals industry.

Source: Compilation of company and third-party reports.³⁹



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About the Authors

Dr. Gautam Jain is a Senior Research Scholar at the Center on Global Energy Policy (CGEP) of Columbia University's School of International and Public Affairs (SIPA). He focuses on the role of financial markets and instruments—including thematic bonds, blended finance structures, and carbon markets—in the energy transition, with an emphasis on emerging economies.

Dr. Jain has an extensive background in the financial industry where he covered emerging markets as a portfolio manager and strategist. He has worked at asset management firms and an investment bank, including The Rohatyn Group, Barclays Capital, and Millennium Partners. He has helped manage emerging market local debt and hard-currency bond portfolios, encompassing currencies, interest rate instruments, and sovereign credits. He specialized in portfolio construction and asset allocation incorporating macroeconomic, policy, and political developments in emerging markets.

He holds a Ph.D. in Operations Research from Columbia University. He also has an M.S. in Industrial Engineering from Iowa State University and a B.Tech. in Mechanical Engineering from the Indian Institute of Technology, Bombay. He is a CFA charter holder, a Cornell EMI Fellow, an Adjunct Professor at Columbia University's School of International and Public Affairs, and a consultant for the United Nations to support the workstream of the Global Investors for Sustainable Development (GISD) Alliance on “Tackling Local Currency Risk”.

He has co-authored publications in the Journal of Derivatives, the Journal of Banking and Finance, the Journal of Applied Probability, Probability in Engineering and Informational Science, and the International Journal of Production Economics. He has also contributed chapters for the 2020 and 2021 Cornell EMI Annual Reports.

Dr. Tom Moerenhout is a research scholar at SIPA's Center on Global Energy Policy and an Adjunct Associate Professor at Columbia University's School of International and Public Affairs. He is also a Senior Advisor at the World Bank, and a Senior Associate at the International Institute for Sustainable Development. He also teaches at NYU Stern School of Business and is a Scholar in Practice at Columbia University's Committee on Global Thought.

Tom's research expertise and practical engagements focus on geopolitics, political economy, and international economic law. Tom's main expertise lies in the role of trade, investment, and industrial policies of relevance to the energy transition, the sustainability dimension of economic globalization, and the economic development of resource rich countries. He has published extensively on sustainable development and energy policy reforms in developing and emerging economies, specifically on energy subsidies, critical minerals, and electric mobility.



For over 12 years, Tom has been responsible for conducting strategic research and market intelligence for governments and development practitioners. In recent years, he has provided in-country support to energy and development policy reforms in India, Nigeria, Lebanon, Egypt, the US, Iraq, Iraqi Kurdistan, Morocco, and Jordan. Tom has worked closely with various organizations such as the World Bank, OECD, OPEC, IRENA, UNEP, ADB, GIZ, Bill and Melinda Gates Foundation, Nestle, and Greenpeace.

Tom holds two master's degrees and a PhD at the Graduate Institute of International and Development Studies in Geneva. Prior to joining Columbia University, he was a visiting fellow at the LSE Department of Government and an Aramco-OIES fellow at the Oxford Institute for Energy Studies. In 2015-2016 he was a Fulbright fellow at Columbia University. In his free time, Tom enjoys reading, good food, football, skiing, and chess.

Preetha Jenarthan serves as the primary manager for commercialization workstreams for the Carbontech Development Initiative. She was a Sustainability and Sustainable Finance professional within the Banking sector with prior experience in decarbonization and energy transition strategy, research, climate risk, climate policy, project management, and client and stakeholder engagement.



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