

Sustainable projects and investments in the metals & mining sector

Full decarbonisation of the metals and mining sector requires huge investment worth hundreds of billions of dollars. The first wide-scale, fully fledged green projects are set to be launched in a couple of years



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Given the lack of available data, calculating the direct environmental costs of corporate activity is not always straightforward. Investment in green and decarbonisation technologies is at a very early stage in the metals and mining sector. Companies are trying to cut their emissions, but at least at first, they are doing so without using expensive advanced technologies.

Despite setting long-term targets, the first projects are largely experimental, although more projects will be launched by 2024. The effectiveness of decarbonising technologies differs widely and new technologies need to be proven before they will be more widely adopted. That is why the level of disclosed investments is low and varies between just 5-10% as percentage of CAPEX among corporates, which have disclosed this data. However, the total investment eventually needed for long-term decarbonisation is huge, reaching hundreds of billions of dollars at least for

the metals and mining sector alone. That new investment will create additional supply in the debt capital markets as soon as mass transformation in the sector has started.

There are several general routes to decarbonising steel, aluminium and most base metals:

- **Produce fewer products**, which is unlikely to happen in the next few years, given the growing demand for metals from sectors impacted by the energy transition.
- **Use clean or CO2 neutral energy from green hydrogen derived from renewables** (wind, solar, hydro) or energy from sustainable biomass.
- **Material / Energy Efficiency** (ie, green hydrogen, direct reduced iron in steel, hybrid electric arc furnaces – already used for steel, and to be tested by aluminium producers. A transition from coal to low carbon-intensive energy sources.
- **Carbon capture and storage**. Relatively new, not widely adapted technology and not really popular given the announced projects which focus more on green energy and coal replacement.
- **Reuse & Recycle materials**. A larger share of recycled and re-used metals will also have a positive impact on carbon emissions reduction.
- **Replacement by materials produced in other sectors**. Potential substitution of some metals by plastics, for example, will also have a positive impact on carbon emissions reduction.
- **Offset carbon footprint by purchasing CO2 quotes from sectors capturing carbon emissions**.

In other words, in order to emit less greenhouse gas, the sector needs to (a) produce less, (b) use advanced technology with more energy-efficient (less-energy intensive) production, capture and store as much carbon as possible and use less carbon-intensive energy sources.

The amount of known investment in green projects varies depending on the technology used to reduce carbon emissions.

Metals & mining sector: selected key green projects to follow up in different sub-sectors

Company/Project	Location	Investments	Project capacity (per annum)	Announce	Launch	Technologies
Green steel projects						
ArcelorMittal SA	Gijón, Spain	EUR1.0bn	2.3mt DRI 1.6mt steel	Jul-21	2025	Green hydrogen direct reduced iron (DRI) hybrid electric arc furnace (EAF) renewable electricity, sustainable biomass
HYBRIT: SSAB, LKAB, Vattenfall	Gällivare, Sweden	SEK2.0bn	1.3mt of fossil-free sponge expansion to 2.7mt steel	Jun-21	2026 (1st) 2030 (2nd)	Green hydrogen production: solar & wind; hydrogen plant; hydrogen storage; EAF
ThyssenKrupp	Germany	EUR5.0bn	400kt by 2025 3.0mt by 2030	Aug-20	2025-2030	Green hydrogen, direct reduction
The H2 Green Steel	Boden-Luleå, Sweden	EUR2.5bn	5mt by 2030	Feb-21	2024-2030	Green hydrogen
EVRAZ North America, Xcel Energy and Lightsource BP	Pueblo, United States	US\$250m	240MW solar farm	Sep-21		Renewable electricity
Nickel projects						
Green steel projects						
Tsingshan Holding Group Co.	Indonesia	US\$2,900m	2.0GW of solar & wind 5.6GW hydropower	Mar-21	2004-2026	Refining battery-grade nickel by using own renewable energy sources
Copper projects						
Anglo-American	Chile			Aug-21		Green hydrogen, solar energy, hydrogen powered vehicles
HyEx: Engie & Enaex	Antofagasta, Chile		2,000MW solar farm powering a 1,600MW hydrogen electrolysis to produce 124ktpa of green hydrogen to produce 700ktpa of ammonium nitrate	Jul-19	2024-2030	Solar power, green hydrogen, green ammonia production which used as leaching agent in the copper industry and as a component of fertilisers
Hydra: Engie & Mining3	Chile		powertrain and refuelling system for mining vehicles			Mining vehicles powered by hydrogen
HIF (Highly Innovative Fuels project): Andes Mining and Energy, ENAP, Enel Green Power, Siemens, Porsche	Magallanes, Chile		250t of green methanol and 250t of carbon neutral fuel	Oct-20	Pilot to be commissioned in 2022	Production of carbon-neutral fuels through wind power, green hydrogen, CO2 capture
Aluminium projects						
Elysis: Rio Tinto/Alcoa/Québec/Apple	Québec, Canada	188CADm		May-18	2024	Inert anode technology
Alcoa	Wagerup, Australia	AU\$28.2m	3MW MVR		2023	Renewal of energy for alumina refining (Mechanical Vapor Recompression)

Source: Corporates, ING Research

Green finance is already booming, but not due to the metals & mining sector

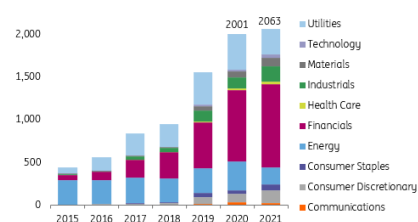
The green finance market is growing rapidly. The total number of new green debt transactions by the corporate sector in the first eight months of 2021 exceeded the total number of green debt transactions in FY2020: 2063 vs 2001, according to BloombergNEF data. The total amount of new debt placed reached US\$639bn, exceeding the US\$452b placed in 2020. This data excludes green asset-backed security transactions, government and supranational transactions and US municipal green bonds.

During the first eight months of 2021, metals and mining corporates placed 33 new bonds across the globe, worth US\$14.9b in total vs 10 new deals in 2020 worth a total of US\$2.9b. The share of green bond transactions from the metals and mining sector is around 2% of the total number of deals by all corporates across the globe.

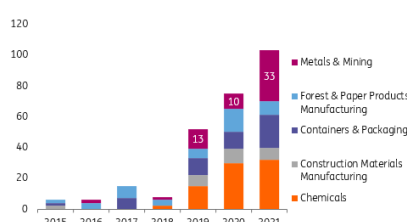
We believe the number of deals and the amount of debt placed by the metals and mining sector will grow rapidly, starting from 2023-2024, as a large number of corporates in the sector advance their carbon emissions reduction projects and as new technologies are adopted.

Green debt transactions

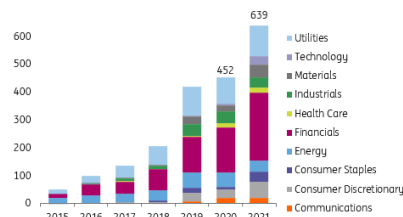
Number of new debt transactions by sector



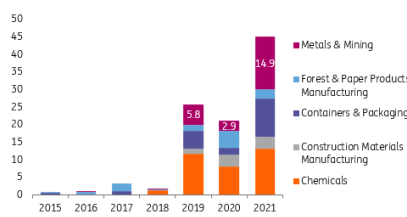
Number of new debt transactions in Materials sector



Amount of new debt transactions by sector (US\$bn)



Amount of new debt transactions in Materials sector (US\$bn)



Source: BNEF

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