Spectrum

Aluminium: Investing into the decarbonisation paradox

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Metals and mining: it's complicated!

Anna Chong, deputy head of corporate credit research, and Jake Goodman, CFA, engagement manager – fixed income

Key points

- Aluminium production is a highly polluting process which contributes 2% of global carbon emissions.
- The metal has tremendous potential to aid the transition towards clean energy and we see supply constraints coupled with growing demand.
- Technological innovation and increased recycling have the potential to reduce the carbon footprint of aluminium producers but more needs to be done to encourage companies to adopt 'cleaner' practices.

The metals and mining sector has had a long and rocky relationship with ESG investors – but innovation, investor engagement, and galvanising the will of the companies themselves is transforming the narrative for this once unloved area of the market.

Metals and mining is a complex sector. On the one hand, it has a reputation for destructive land use and a high carbon footprint. On the other, the sector's output is key to enabling the clean energy transition that is vital to helping us all meet the ambitions of the Paris Agreement. In short, without mining, there will be no net zero. However, in accounting for an estimated 4-7% of global carbon emissions[1], there will also be no net zero if the metals and mining sector continues to conduct its activities using the same industrial practices.

From an investment returns point of view, miners delivered record profits in 2021, and had strong cash flows. This followed years of streamlining capital expenditure which helped constrain supply in many key commodities, and, for now at least, appears in contrast to the boom and bust of previous commodity cycles[2].

Going forward, strong management of ESG factors will be key to the sector's viability within ESG-minded investment portfolios. Continued pressure from environmental activists, local communities and investors, has brought some progress on the ESG spectrum of issues, although more needs to be done. According to research by the Transition Pathway Initiative (TPI)[3], only 16 out of the 111 aluminium, cement, diversified mining and steel companies it studied were doing enough to reduce carbon emissions in line with the objectives of the Paris Agreement.

At Federated Hermes, we are paying particular attention to aluminium as we believe it holds great potential to go from ESG laggard to leader. By leveraging improvements in technology and exploiting its superpower – its infinite recyclability – aluminium is transforming from a problematic metal into a viable opportunity for investors to gain exposure to the energy transition megatrend.

Aluminium: a dirty metal enabling the clean energy revolution

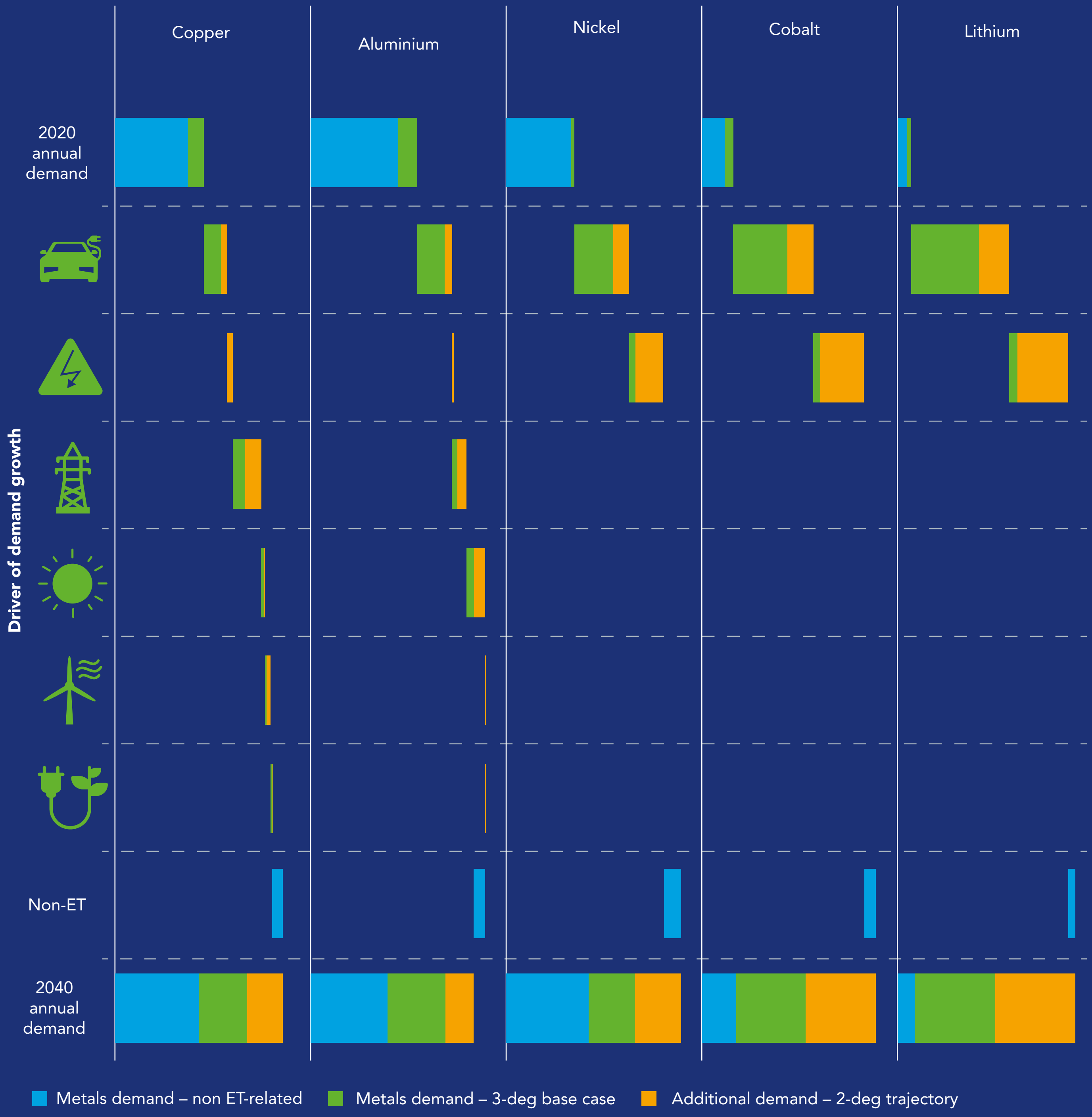
Aluminium exemplifies the paradoxes of the entire sector. Often cited as a commodity of the future, aluminium's lightweight characteristics provide a clear use case in the production of electric vehicles, where a lighter vehicle is more efficient and can achieve superior range for the same battery technology.

Along with light-weighting vehicles, aluminium will play an important role in several other global megatrends including solar and renewable power installations.

[1] McKinsey & Company, 2020.
[2] Bloomberg, 2022.
[3] Transition Pathway Initiative: https://www.transitionpathwayinitiative.org/publications/75.pdf?type=Publication

Chart 1: Metals are an essential component of the energy transition journey

Without cheap, reliable and sustainable metal supply, the speed of transition may be slowed.



Source: Wood Mackenzie.

Positive medium-to long-term trends driven by Chinese supply curbs and environmental cuts are expected to encourage aluminium producers to maintain discipline in their output. High power prices in Europe are encouraging a similar trend across the region while ongoing disruptions to Russian aluminium supply chains – which account for 6% of global aluminium production[4] – are further tightening supply. In the days leading up to its invasion of Ukraine, aluminium prices touched record levels.[5]

Despite this tight supply backdrop, aluminium is increasingly being used as a viable packaging alternative to plastic and has the potential to be used as a substitute for copper should the latter become too expensive or less readily available for electrification. This is among the many roles that aluminium will play in a lower-carbon or sustainable future.

The sector emits

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Yet producing aluminium is, itself, a dirty business. The sector emits 1.1 billion tonnes of CO_2 annually, which represents 2% of global emissions. This figure is expected to rise to 1.6 gigatonnes by 2050 as its use in the global decarbonisation effort continues to boost demand[6]. As aluminium grows in importance, its producers are under pressure to improve on the scant progress made between 2005 and 2018 when greenhouse gas (GHG) emissions intensity for primary aluminium production dropped only 5%[7].

As a result, the industry is not on track to reach net zero by 2050[8]. Meeting any such target will involve bolstering end-of-life scrap collection and further technological advancements to reduce emissions from primary production.

Green aluminium: the investment case

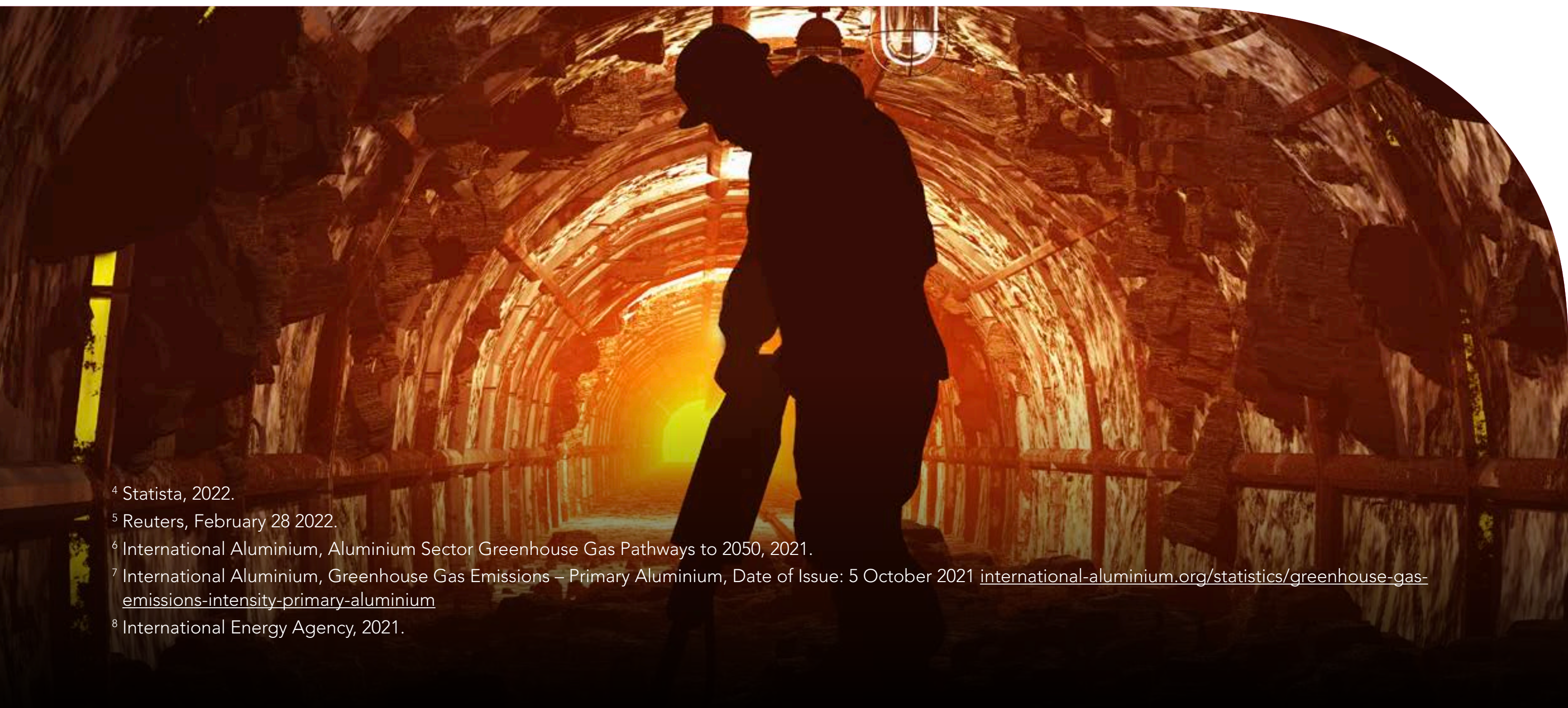
At Federated Hermes, we are focused on investing in companies that are able to access this trend of a fast-growing market for low-carbon aluminium.

> **In another area of the industry, several aluminium companies are actively developing inert anodes, which can replace carbon anodes and significantly reduce emissions from the smelting process.**

One investment opportunity is in efforts to reduce vehicle weight through increased aluminium use. Many major auto original equipment manufacturers (OEMs) – such as Ford, Mercedes Benz, VW and Toyota – are looking to reduce the carbon footprint throughout the product lifecycle (i.e. Scope 3 upstream and downstream) where lower carbon aluminium can differentiate itself.

With light-weighting being a key design consideration for electric vehicles, the rapid projected adoption of electric vehicles (EVs) over internal combustion engines (ICEs), and increased interest in the carbon footprint of the production of vehicles themselves, companies that can produce low-carbon aluminium are likely to be ahead of the curve from both a carbon tax perspective, and from a demand perspective where they have the potential to capture premium pricing for a low-carbon product.

In another area of innovation, several aluminium companies are actively developing inert anodes, which can replace carbon anodes and significantly reduce emissions from the smelting process. The emergence of this technology marks a major breakthrough for the sector, markedly accelerating its progress towards net zero.



[4] Statista, 2022.
[5] Reuters, February 28 2022.
[6] International Aluminium, Aluminium Sector Greenhouse Gas Pathways to 2050, 2021.
[7] International Aluminium, Greenhouse Gas Emissions – Primary Aluminium, Date of Issue: 5 October 2021 international-aluminium.org/statistics/greenhouse-gas-emissions-intensity-primary-aluminium
[8] International Energy Agency, 2021.

Last year, ELYSIS (a joint venture between Rio Tinto and Alcoa) announced it had developed the world's first full industrial design carbon-free aluminium smelting technology which emits pure oxygen as a by-product. The ELYSIS technology replaces the carbon anodes used in traditional aluminium smelting with inert materials. The process is a significant milestone with the potential to transform the aluminium industry and drastically reduce its carbon footprint.

In the next section, we explore why these developments are so meaningful for the sector and how they could be the start of a new chapter in the industry's ESG story.

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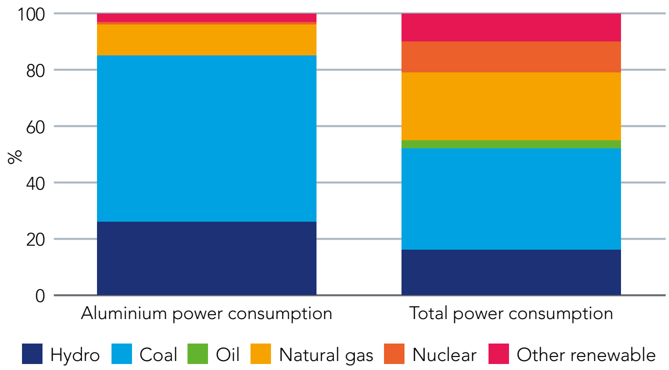
How are aluminium's carbon emissions generated?

Aluminium is found in aluminium ore, or bauxite, and is the most abundant metal in the earth's crust. On account of its accessibility, it can be mined in open pits using relatively less intensive mining processes than other industrial metals. However, large quantities of energy are needed to purify bauxite to produce aluminium oxide – a white powder from which aluminium is produced via electrolysis.

Chart 2: Global aluminium industry power mix compared with global total power mix, 2020



Source: IEA.org, 2020.

The electrolysis of primary aluminium is energy intensive, and the reaction itself creates GHG emissions due to the traditional use of carbon anodes. It should also be noted that within the primary aluminium sector, there is a great deal of differentiation between the highest and lowest carbon intensity primary smelters, driven by energy efficiency and their chosen power source.

Secondary (recycled) aluminium is much less carbon intensive and is estimated to produce 90-95% lower emissions than primary aluminium production[9]. More than 30% of current aluminium production is sourced from scrap[10] – however, this scrap often contains a mix of alloys that may limit its usage.

Given the projected increase in demand – and even with a ramp-up in recycling rates – primary aluminium will still be required globally if the low-carbon energy transition is to be achieved.

[9] https://www.ukri.org/news-and-events/responding-to-climate-change/developing-new-behaviours-and-solutions/using-more-recycled-aluminium-in-new-cars/

[10] International Aluminium Institute.

Pathway to decarbonisation

We see three main decarbonisation pathways for the industry to take to bring it into alignment with the Paris Agreement:

1. Switching to renewable electricity

Reducing indirect emissions created by electricity consumption (~67% of sectoral emissions[11]) represents the greatest opportunity for the industry to reduce its carbon footprint. More than half of the sector's electricity is self-generated, this means that a large proportion of energy supply is within the industry's control. While hydroelectric energy is the ideal replacement, this is only possible at certain locations; 26% of the sector's electricity currently comes from hydro.[12]

2. Reducing process emissions

Direct emissions generated by aluminium processing accounts for some 26% of the industry's GHG output.[13] Reductions are possible by virtue of huge technological advances seen in recent years, including innovation around carbon capture, utilisation and storage, inert anodes and hydrogen.

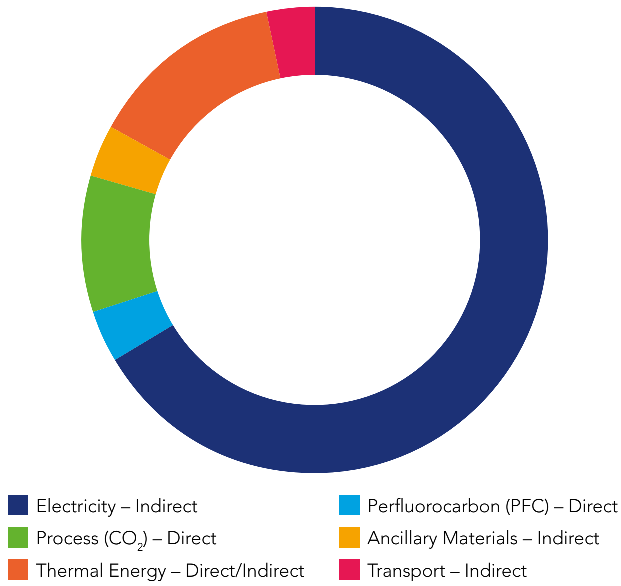
Approximately **75%**
of all aluminium ever produced is still in productive use due to high recycling rates and the metal's infinite recyclability.

3. Closing the loop

Approximately 75% of all aluminium ever produced is still in productive use[14] due to high recycling rates and the metal's infinite recyclability. In recent years, we have seen more downstream companies using recycled aluminium, particularly in the consumer products/packaging space where it is being increasingly used as a replacement for plastics. The International Energy Agency states that 2019 recycling rates were >95% for new scrap and just over 70% for old scrap.

While this is a positive, there is scope for improvement, particularly in the utilisation of technologies that make it easier to remove impurities and additives.

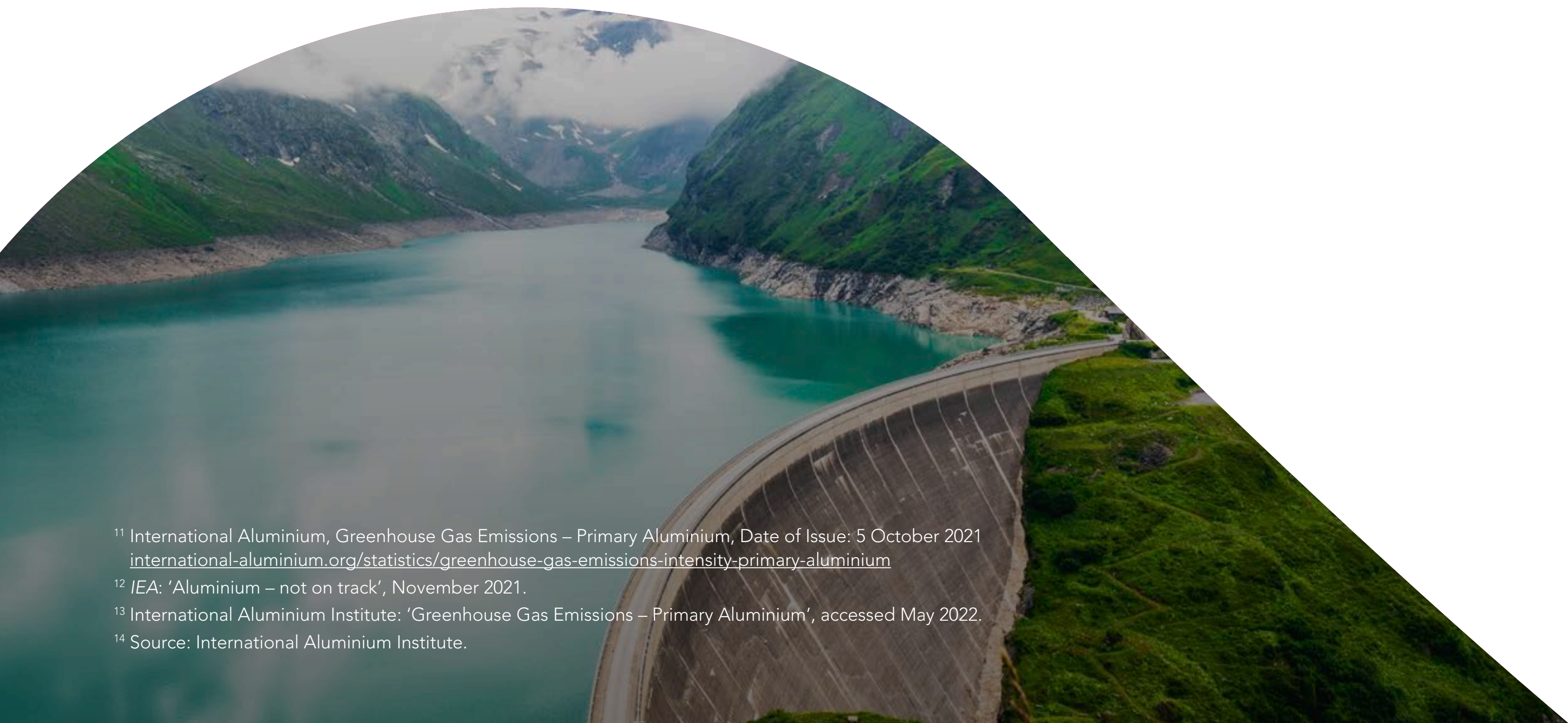
Chart 3: Greenhouse gas emissions – primary aluminium



Source: International Aluminium Institute.

Engagement

As innovation catches up with sentiment, we believe that all companies across the aluminium sector should be taking steps, today, to actively reduce GHG emissions. To this end, we are engaging with companies to encourage clear targets and clarity around how those targets will be achieved. Other areas in which we are actively engaging include health and safety improvements and management of mining waste (along with other forms of pollution). We are also seeking more transparency on issues concerning local communities affected by mining and land rights.



[11] International Aluminium, Greenhouse Gas Emissions – Primary Aluminium, Date of Issue: 5 October 2021 international-aluminium.org/statistics/greenhouse-gas-emissions-intensity-primary-aluminium

[12] *IEA*: 'Aluminium – not on track', November 2021.

[13] International Aluminium Institute: 'Greenhouse Gas Emissions – Primary Aluminium', accessed May 2022.

[14] Source: International Aluminium Institute.

Timeline of engagement with an aluminium producer

Engagement objective: we want the company to set a verified, science-based GHG reduction target

Q4 2019

Engagement actions

We signed a letter to the company encouraging the adoption of science-based targets

Q1 2020

Engagement actions

Meeting with investor relations – we ask it to consider setting a science-based target and TCFD reporting

Q2 2020

Company actions

Company announced more stringent GHG reduction targets aligned with 2°C decarbonisation path

Q3 2020

Company actions

Company publishes climate change policy

Q4 2020

Engagement actions

Meeting with company to discuss strategic review of assets in relation to GHG target, use of coal and trends in green aluminium labeling

Q1 2021

Q2 2021

Engagement actions

We met with the company to talk about the inclusion of ESG metrics in executive remuneration

Q3 2021

Q4 2021

Engagement actions

Attended investor day

During an engagement meeting the company told us it is considering setting an SBTi

Company actions

Company announces net zero target for 2050

Q1 2022

Milestone 1: concern raised

Milestone 2: concern acknowledged

Milestone 3: plan established

Milestone 4: plan implemented

A view from the equities desk

Martin Todd, lead portfolio manager for the Sustainable Global Equity strategy

From an equity investment point of view, the aluminium industry displays some of the strongest fundamentals of the metals and mining complex as ESG factors tighten the levers of supply while driving demand higher.

Although the tightness of the aluminium market long predates the Russian invasion of Ukraine, the conflict has profound implications for the metal on account of Russia being the world's second-largest producer of aluminium, after China. These short-term dynamics are unfolding against the backdrop of a decade-long decline in capital expenditure which means little new capacity is likely to come online for the foreseeable future.

While we expect aluminium prices to continue to trend higher, it is clear that all aluminium producers are not equal: the market will increasingly distinguish between producers using traditional carbon-intensive methods and their greener counterparts. From an investment standpoint, we are positioned for a premium to emerge on the latter, i.e. companies that are using recycling, technology and renewable energy to lower the industry's carbon footprint.

In particular, we see the use of renewable energy in the smelting process as essential if aluminium is to live up to its potential as a 'commodity of the future'.

In terms of specific names, Norwegian producer Norsk Hydro[15] is vertically integrated with hydropower and is leading the way in making zero emissions a reality in the aluminium production process. One of the largest aluminium companies in the world, Norsk Hydro currently emits less than one-quarter of the carbon of the industry average (where smelting – particularly in China – remains largely coal powered[16]). Along with being one of the lowest-carbon aluminium producers globally, Norsk Hydro is also engaged in a number of sustainability initiatives that include doubling the amount of recycled aluminium it produces and using carbon-capture technology to trap, transport and store emissions as they emerge.

Across the wider corporate sector, companies are more conscious of their Scope 3 emissions (i.e. carbon produced as a result of activities not owned or controlled by the reporting organisation). With more and more companies committed to reporting on supply chain emissions, the greener aluminium producers stand to further benefit over their traditional counterparts.

For example, an auto company that has committed to reporting Scope 3 emissions would be significantly more likely to pick the greener option if given the choice between a provider that uses renewables and one that smelts aluminium using coal power (still the most common option for producers in China).

[15] This information does not constitute a solicitation or offer to any person to buy or sell any related securities or financial instruments. The above does not represent all of the securities held in the portfolio and it should not be assumed that the above securities were or will be profitable.

[16] Norsk Hydro, 2022.

Will China rise to the challenge?

Sandy Pei, CFA, deputy portfolio manager, Asia ex-Japan

China's decarbonisation drive is key to the future of the aluminium industry as the country is simultaneously the world's largest consumer and producer of the metal, accounting for nearly 58% of global supplies. With more than 80% of Chinese aluminium production powered by coal, aluminium smelting is among the most emissions-intensive industries in China[17].

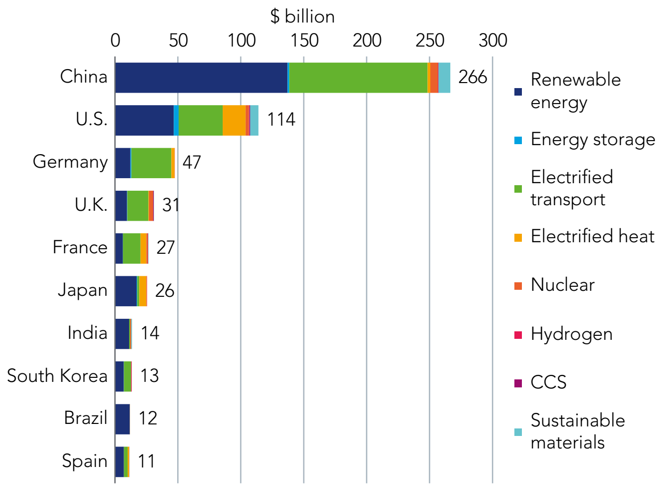
As a result, the country faces great internal and external pressure to decarbonise its economy in a bid to cut crippling pollution levels and advance the global drive towards net zero. We believe China is making progress in the right direction and note the significant financial investment it is making to encourage the shift in capacity from coal to renewables.

While China has a long way to go on its energy transition journey, the country benefits from having historically had a relatively small energy sector. As a result, shifting the capacity it does have towards renewables will be a less painful process than it might be for higher energy-producing economies such as the US and Russia.

In the next phase of this worldwide effort, economies, corporates and individuals must come to terms with the truth that this transition will require significant investment on the part of all who are committed to meeting the targets of the Paris Agreement.

With China having invested $266bn in its energy transition in 2021 – 35% of the global total[18] – there is little doubt that its authorities are taking the issue seriously. Wind and solar energy usage continues to grow, and the country remains the global leader in electric vehicle adoption. All these are areas in which aluminium plays an important role.

Global investment in energy transition by country, 2021



Source: BloombergNEF, 2021. CCS stands for carbon capture storage.

In recognition of aluminium's importance, the government has put renewable energy targets on the metal's producers and provided economic support to facilitate the industry's green transition for at least 10 years. We expect the industry's coal-power usage to peak in 2030 before gradually declining thereafter. However, in the meantime, this capacity switch will continue to tighten the supply/demand dynamic and maintain upward pressure on prices.

[17] https://www.statista.com/
[18] BloombergNEF, 2021.

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