Steel value chain emissions

Overlooked methane risk

Fidelity INTERNATIONAL

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Foreword

Methane has come into sharper focus as a major driver of global warming. From the Global Methane Pledge announced at COP26 to the Oil and Gas Decarbonization Charter launched at COP28, awareness is building. Policymakers and industries have woken up to the urgency of tackling methane — a greenhouse gas approximately 80 times as powerful as CO_2 over a 20-year timeframe. According to the Intergovernmental Panel on Climate Change, methane emissions are responsible for about a third of the human-caused warming experienced today.

In the past, much of the methane spotlight has been on oil and gas, but coal mine methane (CMM) is now demanding attention from companies, regulators, and financial institutions. Despite being a significant source of methane emissions, CMM has received far less scrutiny than oil and gas. This is starting to change as it becomes clear that CMM abatement is a relatively cost efficient way to bring down greenhouse gas emissions.

Metallurgical coal is an important input for the steel sector. For both the coal mining and steel industries—as well as the banks and investors that finance them—better methane management can mitigate regulatory risk, strengthen license to operate, and protect portfolio value in industries that face growing pressure from markets and policymakers alike.

International momentum around CMM is growing. In 2022, several major economies signed the Joint Declaration from Energy Importers and Exporters on Reducing Greenhouse Gas Emissions from Fossil Fuels. At COP28 in the UAE, the Steel Standards Principles contained the first global acknowledgement of methane's importance to the steel industry.

Off the back of this progress, the United Nations Environment Programme's International Methane Emissions Observatory (IMEO) formed the Steel Methane Programme, aiming to create an international framework to address metallurgical CMM due to its significance to the steel sector.

> As scrutiny increases, financial institutions have a decisive role to play.

To date, few mining or steel companies disclose methane data or clear plans to reduce emissions. That gap presents investors with both risk and opportunity. Engagement on disclosure and abatement strategies can drive progress—while M&A activity across the coal and steel sectors creates another lever for influence.

A decade ago, cutting methane emissions was viewed as technically difficult and commercially unattractive. Today, proven abatement technologies exist, costs have fallen, and solutions are deployable at scale. One missing ingredient is consistent pressure from capital markets. For investors, that means a chance to unlock climate progress, protect asset value, and shape the future of a hard-to-abate sector. The financial community helped move the oil and gas industry; now it's time to do the same for the steel value chain.

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Executive summary

The steel sector stands at a critical juncture. As renewable energy infrastructure demand grows, the sector paradoxically becomes both a solution and a problem. Representing 8% of global energy system emissions from its direct operations, the steel value chain contains an overlooked threat to global climate commitments: methane from upstream metallurgical coal extraction.

Methane leakage from metallurgical coal production contributes an additional 27% to steel's near-term climate footprint when measured using a 20-year warming potential (methane is 84 times more powerful than CO_2). This is equivalent to the emissions of Japan in 2023. While this neglected emissions source rivals the output of entire nations, it remains conspicuously absent from most decarbonisation strategies and risk assessments.

Traditional decarbonisation pathways that focus solely on blast furnace conversion and hydrogen-based production miss this critical upstream vulnerability.

While a green steel transition is underway, this transition will take time, and metallurgical coal use will remain persistent for many years. For institutional investors, this presents a growing climate risk as methane measurement practices improve and regulators become increasingly aware of the comprehensive lifecycle emissions of steel production.

The path forward demands action. Methane's shorter atmospheric lifetime means that reductions deliver immediate climate benefits—making this one of the most effective near-term interventions available.

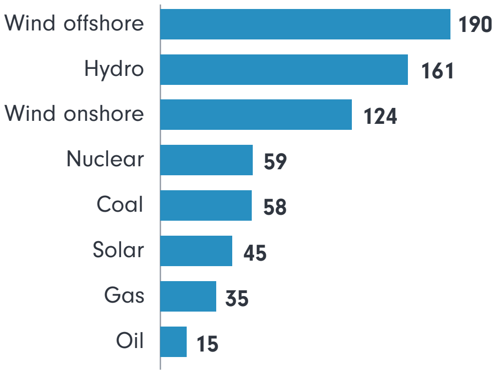
The steel industry's decarbonisation journey cannot succeed through green technology development alone. Instead, the steel sector must address its persistent dependence on metallurgical coal and subsequent methane emissions, which create systemic risks that extend far beyond traditional carbon accounting frameworks.

Introduction

Steel forms the structural foundation of the global economy, being an essential part of everything from urban skylines to wind turbines. As governments worldwide accelerate renewable energy deployment, steel demand is expected to remain robust while steel capacity continues to grow. This critical material enables the technologies designed to decarbonise the economy—from offshore wind platforms to electric vehicle chassis—making it an indispensable component of the clean energy transition.

Figure 1. Steel intensity of renewable power technologies

Renewable power tends to require more steel compared to fossil fuels (Steel t/MW of capacity)



Source: BHP – steel and iron ore market outlook, 2022.

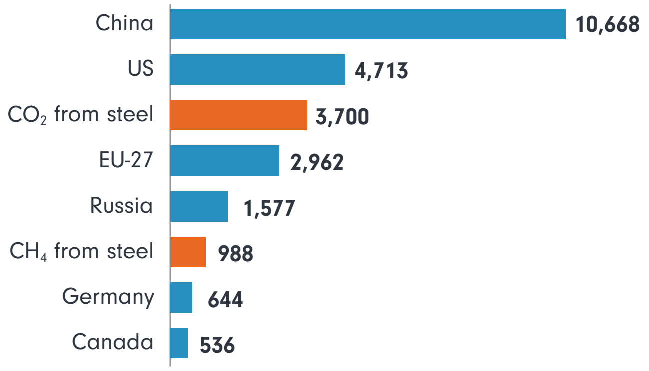
Despite its economic importance, steel production represents one of the world's largest decarbonisation challenges, accounting for approximately 8% of total global energy system emissions.[1] The reason lies in the dominant steel production method. Roughly 70% of global steel relies on the Blast Furnace-Basic Oxygen Furnace (BF-BOF) route, where metallurgical coal is transformed into coke—a carbon-rich fuel essential for converting iron ore into molten iron. This process is inherently carbon-intensive, generating approximately two tonnes of CO_2 for every tonne of crude steel produced.[2]

Innovative technologies such as hydrogen-based direct reduction and electric arc furnaces offer a promising path towards greener steel production; however, their widespread implementation has been slow. This delay impacts the emissions profile of the steel-making value chain and investor exposure to an emissions intensive sector. This underscores the need for a shift in focus to address more immediate emissions reduction avenues.

While steelmaking's direct emissions capture headlines, a significant proportion of steel's carbon footprint remains largely invisible to investors and policymakers. Lifecycle emissions analysis reveals that upstream activities—particularly metallurgical coal mining—contribute substantial additional emissions that rarely appear in steelmakers' emissions reporting. Using a 20-year timeframe (Global Warming Potential [GWP] of 84 times), methane emissions from metallurgical coal mining can add 27% more to the lifecycle emissions of steel.[3]

Figure 2. Coking coal mine methane accounts for ~27% of the steel industry's 20-year climate impact

National CO_2-only emissions (mt). Steelmaking CO_2 and CH_4 emissions in million tonnes CO_2e (GWP-20)



Source: Ember, 2023, Why the steel industry needs to tackle coal mine methane.

These methane emissions represent a critical blind spot in climate risk assessments. Unlike thermal coal, for which there are cleaner and often more cost-effective substitutes for power generation, metallurgical coal maintains structural demand tied to steel production. The more ambitious the renewable energy scenario, the more steel infrastructure required, creating persistent metallurgical coal demand as well as the associated methane emissions.

1. IEA, 2023, Emissions Measurement and Data Collection for a Net Zero Steel Industry – Analysis – IEA.
2. WorldSteel.Org, 2024 – Sustainability Indicators 2024 Report – worldsteel.org.
3. Ember, 2023, Ember-report-Why-the-steel-industry-needs-to-tackle-coal-mine-methane.pdf.

Even in the 2023 International Energy Agency (IEA)'s Net Zero 2050 scenario, 37% of the projected share of total primary steel production in 2050 is driven by Carbon Capture, Utilisation and Storage-equipped processes. This underscores the demand resilience of metallurgical coal well into the decarbonisation era.[4]

> The intersection of steel's economic centrality and metallurgical coal's methane intensity creates a complex investment risk.

As regulatory frameworks increasingly price carbon and methane emissions, companies with exposure to high-emission metallurgical coal operations could face mounting financial pressures. Carbon border adjustments, methane regulations, and sustainability-driven capital allocation decisions will likely penalise the most emission-intensive operations while rewarding cleaner alternatives.

Already, carbon pricing is beginning to impact Australian metallurgical coal producers. Several miners have reported margins being impacted by higher operating costs under the Safeguard Mechanism. In response, some are trialling methane abatement at both underground and open-cut mines. While these projects currently rely on government support and other subsidies, as the price of carbon increases in Australia from current levels of A$35/tCO2-e and Safeguard Mechanism measures tighten, these abatement projects will increasingly become commercially viable on a standalone basis.

Furthermore, based on IEA calculations, estimated metallurgical coal methane abatement costs are estimated to remain a small fraction of retail steel pricing today. However, tight margins at steel mills and growing regulatory scrutiny suggest that metalurgical coal producers will face disproportionate pressure across the value chain. For investors, this highlights concentrated downside risk in high-methane assets and an opportunity for suppliers able to demonstrate lower emissions or credible abatement pathways.

Recognising the systemic nature of metallurgical coal methane risks across portfolios, Fidelity International is implementing a comprehensive systems engagement towards exposure to this risk. The approach is designed to drive transparency for risk mitigation, policy development, and encourage abatement solutions throughout the steel value chain. This approach acknowledges that individual company engagement, while important, is insufficient to address the structural challenges that limit methane abatement deployment.

While Fidelity continues to advocate for the advancement of green steel technologies, the team recognises the complex market dynamics and the imperative to prioritise immediate emissions reduction strategies like methane abatement. Addressing methane emissions is crucial for mitigating climate impacts and fostering a sustainable future for the steel industry. Given steel's indispensable role in economic development and the persistent demand for metallurgical coal, methane risk assessment must be a focus area for investors and governments alike.

4. IEA, 2023 – Net Zero Roadmap: A Global Pathway to Keep the 1.5°C Goal in Reach – Analysis – IEA.

Why methane matters: The overlooked climate multiplier

While much attention has focused on carbon dioxide emissions from steel production, methane represents an equally critical yet underappreciated component of the sector's climate impact. Methane is the second-most-important greenhouse gas contributor to climate change, following carbon dioxide.

On a 100-year timescale, methane has 28 times greater global warming potential than carbon dioxide, and is 84 times more potent on a 20-year timescale. This dramatic difference in warming potential over different time horizons means that methane emissions have an outsized impact on near-term climate trajectories. The urgency of addressing methane emissions stems from both their potency and their atmospheric lifetime. Methane breaks down in the atmosphere over approximately 12 years, compared to centuries for carbon dioxide.

> This shorter lifetime means that methane reductions deliver more immediate climate benefits – making this one of the most effective near-term climate interventions available. For investors with climate objectives, this creates a compelling opportunity.

Companies that successfully reduce methane emissions can demonstrate tangible climate progress within more immediate investment timeframes.

The potency of methane is receiving increasing scrutiny from a variety of stakeholders, including civil society and governments, raising potential risks for the companies Fidelity invests in. As climate science has clarified methane's role in driving near-term warming, regulatory frameworks and investor expectations have evolved rapidly. What was once an overlooked emission is now becoming a material financial risk—and opportunity—for companies across the steel value chain.

The steel-coal-methane connection

Steel production's reliance on metallurgical coal creates a persistent methane challenge that distinguishes it from other industrial sectors. Unlike thermal coal used in power generation—which can be replaced by renewable energy—metallurgical coal serves as both a chemical reductant and carbon source in primary steel production. This fundamental chemistry means that even as the world transitions to clean energy, traditional steel production pathways will continue to depend on metallurgical coal for the foreseeable future.

Moreover, given the average age of global blast furnace fleets remains relatively young (China's average furnace age is just 12 years),[5] the transition to alternative steelmaking technologies will be further delayed by commercial viability constraints and established capital asset replacement cycles.

Methane emissions are generated through the extraction of metallurgical coal. Coal seams naturally contain methane, which has been formed over millions of years. When miners extract coal, this trapped methane is released.

Metallurgical coal is significantly more methane-intensive than thermal coal, with an average methane intensity of 10.7 tCH4/kt of coal compared to thermal coal's 4.35 tCH4/kt.[6] This higher intensity stems from geological factors. Metallurgical coal typically comes from deeper, gassier seams where higher-quality coking properties correlate with greater methane content.

This creates a compounding challenge for the steel sector. Not only does steelmaking generate substantial direct CO_2 emissions, but its essential input—metallurgical coal—brings significant methane emissions that rarely appear in corporate carbon accounting.

> In 2023, at COP28, the Steel Standard Principles marked the first global recognition of methane's significance within the steel industry, establishing universal principles for measuring emissions in this sector.

The Steel Methane Programme (SMP), supported by UN Environment Programme's International Methane Emissions Observatory (IMEO) began operating the same year and aims to engage metallurgical coal producers in identifying and mitigating methane emissions across the value chain. As steel demand remains robust to support infrastructure development and the energy transition, these hidden methane emissions will persist unless actively addressed.

5. Wood Mackenzie, 2025 – Green steel in China: easier said than done | Wood Mackenzie.
6. UNEP IMEO Steel Methane Programme.

Scale of the problem: Methane emissions from metallurgical coal

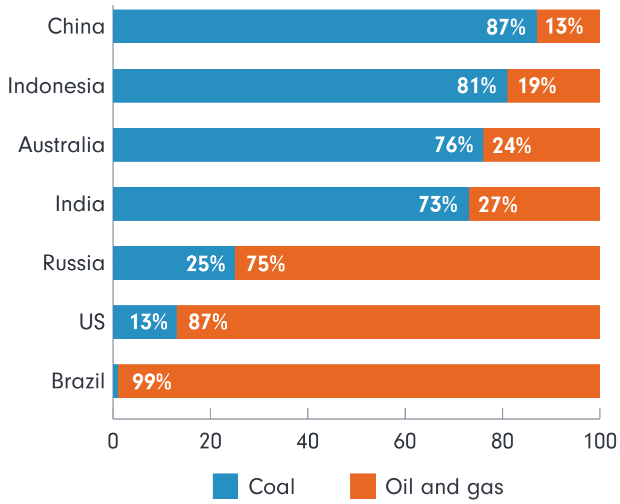
Global methane emissions from metallurgical and thermal coal mining reached approximately 40 million tonnes in 2023, equivalent to around 34% of all energy-related man-made methane emissions.[7] Within this total, metallurgical coal mine methane emissions are responsible for around 25% of coal mining emissions, or approximately 10 million tonnes of methane annually (8% of energy-related methane emissions).[8] When converted to CO_2 equivalent (CO_2e) using the 100-year warming potential, this represents 280 million tonnes of CO_2e—comparable to the annual emissions of a major industrialised nation like Spain, the UAE and the Philippines.

Cutting methane emissions from fossil fuels by 75% by 2030 is vital to limit warming to 1.5 degrees.[9] The IEA estimates that around 80 million tonnes of annual energy-related methane emissions can be avoided through the deployment of known and existing technologies.[10] The IEA also estimates that almost a third of that abatement potential can be driven by the coal sector, across metallurgical and thermal coal mines, highlighting the imperative role that coal mine methane abatement plays in reaching net zero.[11]

The concentration of these emissions creates both risks and opportunities. According to Ember, 90% of metallurgical and thermal coal mine methane comes from only nine countries, with China alone responsible for approximately 70% of global thermal coal and metallurgical coal mine methane emissions.[12] Russia, Australia, Indonesia and India collectively account for much of the remainder. This geographic concentration means that focused action in a handful of countries could deliver outsized global impact.

These emissions predominantly originate from underground mining activities, where methane trapped in coal seams is released during extraction. The challenge is compounded by measurement gaps. Recent studies reveal that global methane emissions are significantly underreported. The IEA estimates that methane emissions from energy-related methane emissions, including coal, may be underreported by approximately 80%.[13]

Figure 3. Share of methane emissions in the energy sector (only coal and oil and gas) by country



Source: IEA, 2023, https://www.iea.org/reports/global-methane-tracker-2023/overview; RMI.

However, there is a measurement revolution underway, which is transforming the understanding of the scale of the problem. Technological advances in satellite monitoring and ground-based detection systems are enhancing transparency around methane emissions. Current measurements focus mostly on underground coal mines, where methane is vented for safety. However, these measurements are expanding to often-overlooked emissions from open-cut mines and largely-omitted methane leaks from abandoned coal sites. As measurement improves, the true scale of the methane challenge will become clearer—and, with it, the materiality of this risk for investors.

7. IEA, Global Methane Tracker 2024 – Key findings – Global Methane Tracker 2024 – Analysis – IEA.
8. IEA, Global Methane Tracker 2023 – Strategies to reduce emissions from coal supply – Global Methane Tracker 2023 – Analysis – IEA.
9. IEA, Global Methane Tracker 2024 – Key findings – Global Methane Tracker 2024 – Analysis – IEA.
10. IEA, Global Methane Tracker 2024 – Key findings – Global Methane Tracker 2024 – Analysis – IEA.
11. IEA, Global Methane Tracker 2024 – Key findings – Global Methane Tracker 2024 – Analysis – IEA.
12. Ember, 2024 – https://ember-energy.org/focus-areas/coal-mine-methane/; Global Energy Monitor, 2024 – GEM-China-Coal-Mines-Sept-2024.pdf.
13. IEA, Global Methane Tracker 2025 – https://www.iea.org/reports/global-methane-tracker-2025/key-findings.

Regulatory momentum and investment risk

The regulatory landscape for methane is rapidly evolving, transforming what was once an operational consideration into a material financial risk. This shift is occurring across multiple jurisdictions simultaneously, creating a new investment consideration for companies across the steel value chain.

Global methane pledge drives policy convergence

Over 150 countries have signed the Global Methane Pledge, committing to reduce methane emissions by at least 30% from 2020 levels by 2030. With methane abatement in metallurgical coal mining having more readily available solutions than other sectors like agriculture, governments are increasingly focusing on coal mine methane as a key component of their compliance strategies. This is particularly true for countries with large exposures to metallurgical coal methane emissions, such as Australia and China.

Moreover, the first-ever EU rules to curb methane emissions from the energy sector have become legislation, with the EU Methane Regulation entering force on 4 August 2024. These regulations will require importers to provide detailed emissions data from their supply chains, creating direct compliance requirements and reputational risks for companies sourcing from high-methane operations.

Financial implications accelerating

The financial implications for steel value chain companies are becoming increasingly material. If methane is priced in line with its global warming potential—more than 84 times that of carbon dioxide over 20 years—this could dramatically increase emissions costs. For miners and steel companies, this could affect operational margins, investment decisions and competitiveness, especially in export markets where buyers are increasingly scrutinising full value chain emissions.

Australia's Safeguard Mechanism, which prices emissions above baseline thresholds, could also significantly impact coal mining operations if methane emissions are more comprehensively included. Currently, many methane emissions—particularly those from upstream metallurgical coal mining—are underreported or excluded entirely. However, as methodologies improve and regulators move to include methane in compliance obligations, the cost of emissions-intensive inputs could rise sharply.

Furthermore, as methane transparency improves through satellite monitoring and mandatory reporting, the gap between leaders and laggards will become increasingly visible to investors, customers, and regulators alike. This visibility will likely accelerate the repricing of methane risk across the sector.

Market dynamics: Concentration creates systemic risk

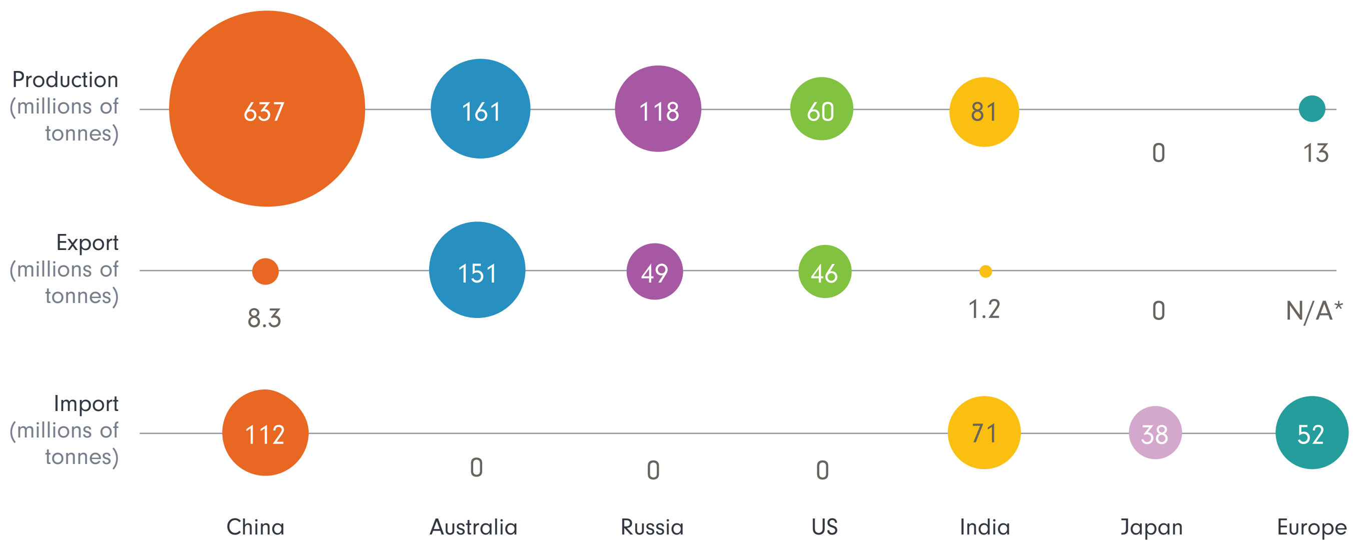
The global metallurgical coal market structure amplifies methane-related investment risks through its concentrated supply chains and persistent demand dynamics. Understanding these market fundamentals is essential for assessing exposure across portfolios.

Supply concentration creates systemic risk

The metallurgical coal export market is dominated by a handful of countries. China remains the dominant consumer, accounting for over half of global steel production and corresponding metallurgical coal demand. India follows, driven by rapid infrastructure growth and expanding steel capacity. Europe is the third-largest importer, while Japan and South Korea, with advanced manufacturing sectors, also remain significant buyers.

Australia is by far the largest exporter, supplying high-grade product primarily to Asia. Other key exporters include Russia—though geopolitical constraints have disrupted trade flows—along with the United States and Mongolia (which is emerging as a new supply source). This concentration means that methane management practices in just a few countries can impact global steel supply chains.

Figure 4. Global metallurgical coal production and trade 2023



Source: SteelWatch, IEA, 2025 – SteelWatch Explainer: Met coal: what it is and why it is a climate risk – SteelWatch.

*Data not available for intra-EU trade of met coal.

China and Australia: Two metallurgical coal powerhouses

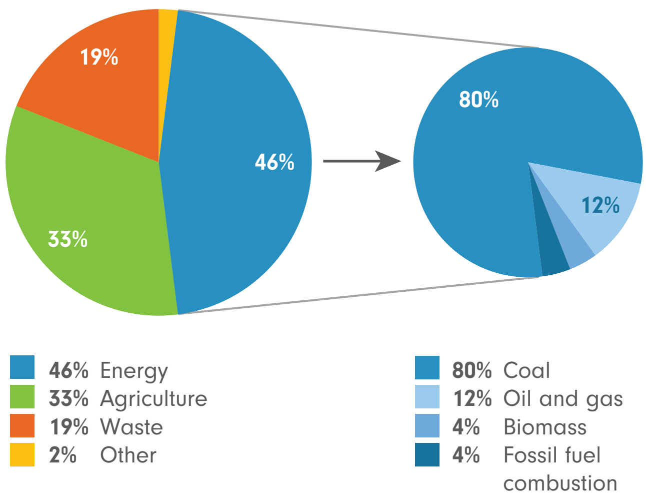
China's dual role in metallurgical coal

China presents a dual challenge and opportunity in metallurgical coal methane management. As both the world's largest steel producer and coal consumer, China's practices have global implications for companies that operate in Chinese markets, sell to Chinese manufacturers or compete with Chinese steel producers. While less than 15% of China's total coal production in 2023 was metallurgical coal, China remains the world's largest metallurgical coal producer, producing four times more than Australia (the next largest metallurgical coal producer).[14]

China is responsible for the world's largest man-made source of methane emissions, with metallurgical and thermal coal mine methane being the predominant contributor. China's metallurgical and thermal coal mines are responsible for more methane emissions than the rest of the world combined. In 2022, metallurgical and thermal coal mine methane emissions represented 37% of total methane emissions at 55.67 million tonnes.[15] Satellite observations in Shanxi province alone identified 82 major methane emitters with combined annual emissions of up to 1.2 million tonnes—roughly equivalent to 4.2 times the integrated flux from the Permian Basin (one of the world's largest oil and gas methane hotspots).[16]

Furthermore, with more coal mine expansion planned, China is poised to become an even larger source of global metallurgical and thermal coal mine methane emissions. If all company development plans and proposed projects materialise (as at April 2024), another 10 million tonnes of methane will be emitted annually, potentially accounting for nearly 75% of projected methane releases from proposed mines worldwide.[17]

Figure 5. China's 2022 methane emissions by sector, and a breakdown by industries in the energy sector



Source: International Energy Administration, 2023, https://www.iea.org/reports/global-methanetracker2023/overview; and RMI analysis.

Moreover, the abandoned mine challenge in China creates long-term risks for the sector. China has nearly 9,500 abandoned coal mines, with emissions from these sources potentially exceeding those from active mining operations by 2035.[18] The potential for increased methane emissions from new mine sites, coupled with the challenge of abandoned coal mine methane, poses significant risks to China's climate goals.

To combat these challenges and to further extract methane's energy value, China has started to establish a full suite of policy measures aiming to control methane emissions from major contributing sectors and to incentivise methane recovery and utilisation.

14. IEA, Coal 2024 Analysis and Forecast to 2027 – Coal 2024: Analysis and forecast to 2027. Note that there are data discrepancy issues between IEA and the National Bureau of Statistics and Ministry of Commerce.
15. IEA, 2022.
16. Ge Han, Zhipeng Pei, Unveiling Unprecedented Methane Hotspots in China's Leading Coal Production Hub: A Satellite Mapping Revelation.
17. Global Energy Monitor, 2024 – After brief slowdown, China ramps up coal output – Global Energy Monitor.
18. CarbonBrief, 2024 – China Briefing 22 August 2024: 'Groundbreaking' guidelines for 'green transition'; Coal plant approvals 'drop sharply'; Methane emissions from abandoned coal mines – Carbon Brief.

Moreover, China is actively pursuing technological solutions for thermal and metallurgical coal mine methane abatement. Projects focusing on ventilation air methane (VAM) and ultra-low-concentration coal mine methane are technologically complex and can require high investment and operating costs.

Despite these challenges, over 20 projects have been implemented in China since 2008, employing methods such as oxidation power generation and cogeneration.[19]

Australia's export exposure to metallurgical coal

Australia is the largest metallurgical coal exporter in the world, with 46% total market share.[20] Australia supplies critical steelmaking inputs to major manufacturing regions including India, Japan, Germany, Vietnam, China, Korea and Turkey.

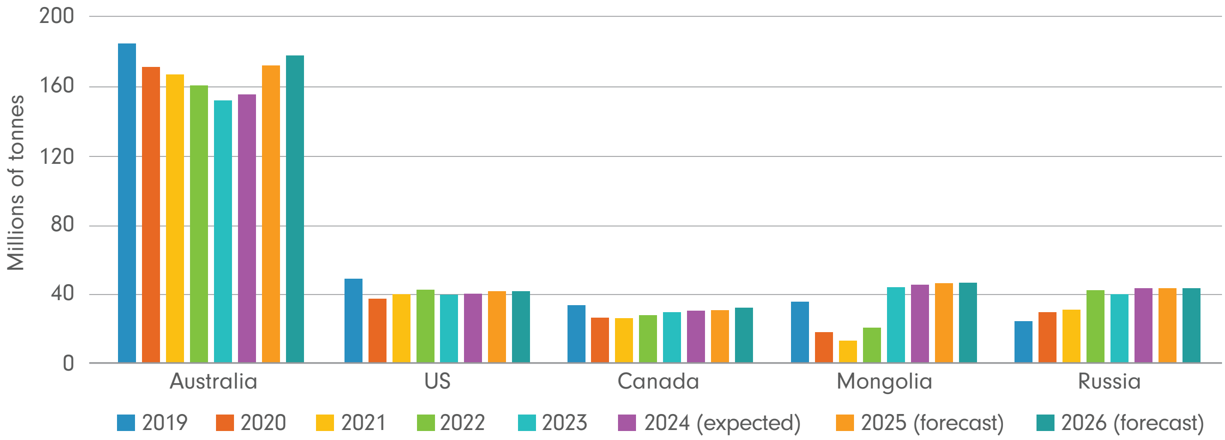
Currently, there are around 100 operational coal mines in the country, with more than 60% of coal mines being open-cut and over 80% of coal produced from these mines.[21] In 2023, 35% of Australia's total coal production volumes were metallurgical coal.[22]

Metallurgical coal production is projected to remain robust, with industry players expanding their capacity. The state of Queensland hosts the majority of mines, with 56 mines, roughly 44 open-cut and 12 underground. New South Wales (NSW) follows with 39 mines (22 open-cut and 17 underground).[23] In 2023–24, metallurgical coal exports generated A$54 billion in revenue, supporting thousands of jobs and contributing significantly to Australia's trade balance.[20]

Australia presents a unique methane emissions profile that diverges significantly from global patterns. While the oil and gas sectors typically dominate energy methane emissions globally, methane from thermal coal and metallurgical coal mining contributes 26 million tonnes or almost 55% of Australia's energy methane emissions,[24] larger than gas-related methane emissions.

Despite underground mines being more emissions-intensive, addressing the environmental impact of open-cut mines is crucial for achieving meaningful change. In Australia, open-cut mines are responsible for more than half of total methane emissions from coal mining, yet methane abatement is rarely performed in open-cut operations.[25]

Figure 6. Select group of metallurgical coal export countries and their export volumes



Source: DISR, 2024.

19. China's Ministry of Ecology and Environment, 2025.
20. DISR, 2024.
21. Geoscience Australia, May 2025.
22. IEA, Coal 2024 Analysis and Forecast to 2027 – Coal 2024: Analysis and forecast to 2027, DECCEEW, 2024.
23. EMBER, 2022 – FINAL – Tackling Australia's Coal Mine Methane Problem.
24. DECCEEW, 2024.
25. IEEFA, 2024, Growth in Australian open-cut coalmining raises urgency of methane abatement | IEEFA.

Barriers to action: Understanding implementation challenges

Despite the financial and climate case for methane abatement, significant barriers prevent widespread adoption of available technologies. Understanding these constraints is essential for realistic assessment of company trajectories and engagement strategies.

Safety as a top priority

Mine safety represents the primary driver for methane management in underground coal operations. Methane concentrations of 5 – 15% in the atmosphere create explosion risks that have historically resulted in catastrophic accidents. This necessitates continuous ventilation systems that dilute methane to safe levels, but also results in large volumes of low-concentration emissions that are technically and economically challenging to capture.

Recent incidents underscore these challenges. Anglo American's Grosvenor underground coal mine operations were suspended in June 2024 due to a methane gas ignition. In China, despite significant progress since the 11th Five-Year Plan (2006 – 2010) when methane was treated solely as a safety concern, balancing safety and emissions reduction remains complex. Current safety regulations can create inherent constraints on the pace and scale of methane abatement efforts.

Policy and regulatory fragmentation

The policy environment for coal mine methane abatement remains fragmented across key production regions. While some jurisdictions have established comprehensive frameworks, others lack basic reporting requirements or financial incentives for abatement. This patchwork approach creates uncertainty for companies operating across multiple jurisdictions and limits investment in long-term abatement infrastructure.

Data availability represents a critical constraint. There is a lack of globally harmonised, transparent, site-level data on coal mine methane emissions. Information is often fragmented, technical and inaccessible, making it difficult for companies to assess their supply chain exposure or develop targeted strategies. Without reliable baseline data, setting meaningful reduction targets or tracking progress is challenging.

Financial mechanisms to support abatement remain underdeveloped in most jurisdictions. While integrating coal mine methane into emissions trading schemes could provide economic incentives, most carbon pricing frameworks lack comprehensive coverage of methane emissions or appropriate comparisons relative to CO_2. The absence of consistent, long-term price signals discourages capital-intensive abatement investments.

Technical and economic viability constraints

The technical barriers to methane abatement vary significantly based on mine characteristics. Coal mine methane concentrations can range from less than 1% to over 30%, with concentration directly impacting economic viability—the lower the concentration, the more technically and economically difficult abatement becomes.

Analysis suggests that it is technically possible to avoid over half of global coal mine methane emissions with existing technologies. Implementation, however, faces scalability challenges. Many proven technologies work well in pilot projects but struggle with the variable flows, changing concentrations and harsh operating conditions of commercial mining operations.

Market and infrastructure limitations

Infrastructure constraints create additional barriers. Many mining operations are located in remote areas lacking gas pipeline connections or electricity grid capacity to utilise captured methane. Building dedicated infrastructure for individual mines may not be economically justified, particularly for operations with limited remaining mine lives.

Legal and regulatory challenges around methane ownership create uncertainty for potential project developers. In many jurisdictions, unclear property rights for coal mine methane limit third-party investment in abatement infrastructure. Permitting structures that separate land and gas rights further complicate project development, limiting mine owners' ability to capture and utilise methane even when economically viable.

Systems engagement: Fidelity's approach to methane risk management

Recognising the systemic nature of metallurgical coal methane risks, Fidelity International is implementing a comprehensive systems engagement approach designed to drive transparency for risk mitigation and policy development, as well as to encourage abatement and solutions throughout the steel value chain. This approach acknowledges that individual company engagement, while important, is insufficient to address the structural challenges that limit methane abatement deployment.

As a global investor, Fidelity International is using systems engagement to elevate awareness of methane emissions and their materiality across the broader investor ecosystem. This includes advocating for greater policy certainty around methane abatement pathways, which could help to unlock long-term investment and reduce regulatory risk. The team also works to drive attention towards the development and deployment of innovative methane abatement technologies.

Supporting a viable ecosystem of solutions is critical to reducing emissions at scale. Fidelity International is engaging constructively with our investee companies to help them manage climate risks in a considered and forward-looking manner. Our approach emphasises collaboration, long-term value creation, and ensuring companies remain competitive in a rapidly shifting global context. By encouraging proactive disclosure, supporting transition planning, and backing companies willing to lead on innovation, Fidelity International is seeking to help shape a more resilient steel and mining value chain. Ultimately, this systems-level strategy supports our fiduciary responsibility while aligning capital with climate-positive outcomes and seeking long-term market stability.

Conclusion: Anticipating and managing emerging climate risk

Methane represents a critical yet underappreciated climate risk that demands immediate attention from investors. The persistent dependence on metallurgical coal for steel production creates systemic risks that extend far beyond traditional carbon accounting frameworks.

As the regulatory landscape evolves and methane emissions measurement improves, companies that are unprepared face increasing climate risk exposure. Fidelity International believes that early engagement on metallurgical coal methane risks is essential to positioning investment portfolios for success in an increasingly carbon-constrained global economy. Companies that lead in supply chain methane management may gain competitive advantages through reduced regulatory risk, enhanced stakeholder confidence, and preferential access to increasingly carbon-conscious markets.

Fidelity International's systems engagement approach reflects the belief that addressing systemic risks requires collaborative action across the investment community, portfolio companies, and policy makers. By working to raise awareness, drive transparency, support policy development, and facilitate collaborative abatement solutions, the team aims to protect and enhance long-term portfolio value while supporting the broader transition to lower-emission steel production.

About Fidelity International

Fidelity International offers investment solutions and services and retirement expertise to more than 2.8 million customers globally. As a privately held, purpose-driven company with a 50-year heritage, we think generationally and invest for the long term. Operating in more than 25 locations, we invest A$713 billion globally on behalf of clients in the Asia-Pacific, Europe, the Middle East and South America. We are responsible for A$308.6 billion in assets under administration.*

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