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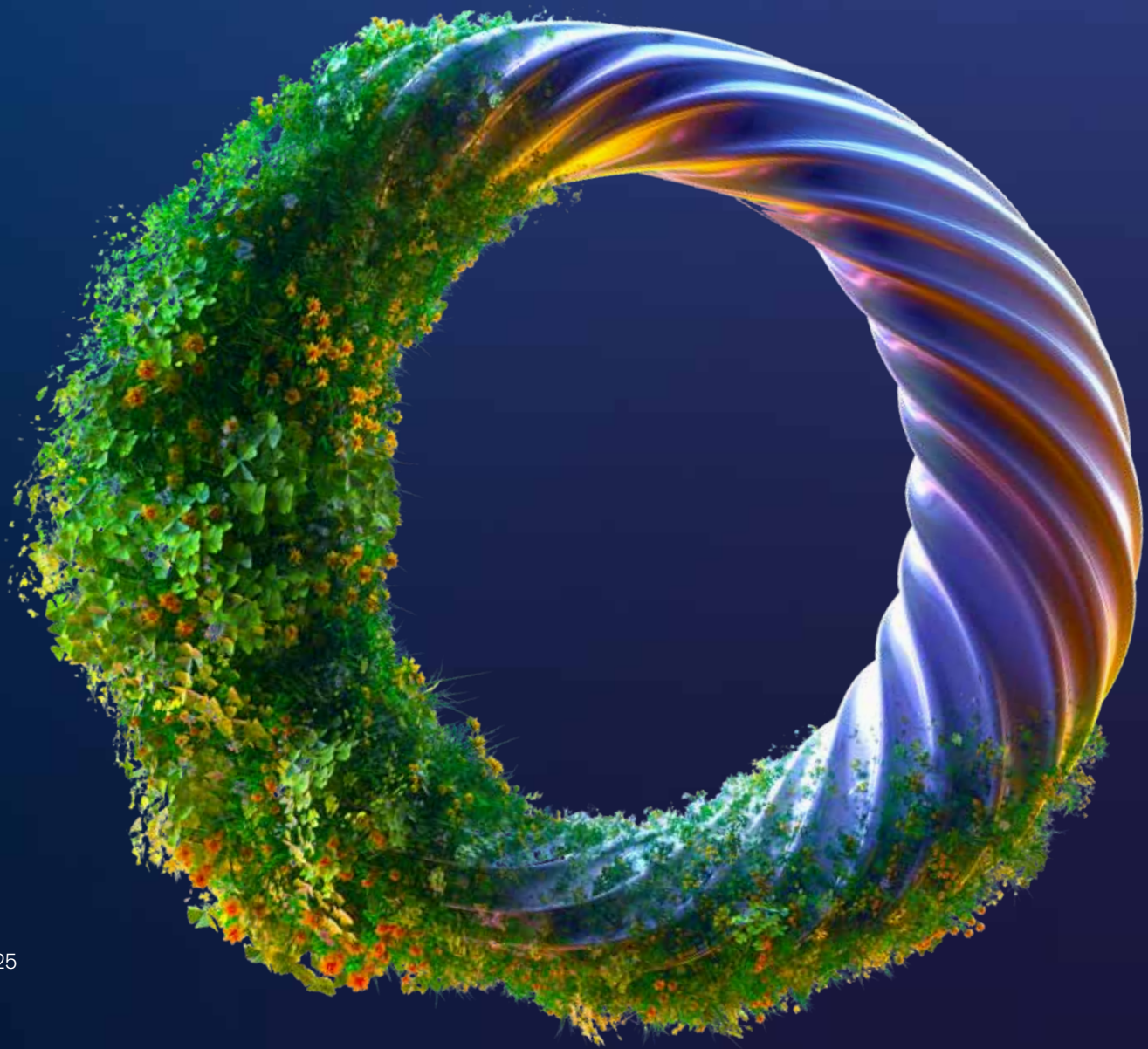
Strengthening the future

Steel for growth and resilience



September 2025

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Acknowledgments

McKinsey & Company has prepared this independent perspective as part of its role as knowledge partner for the sixth Indian Steel Association (ISA) Steel Conclave.

The authors thank the ISA for organizing the conclave and its members for contributing to this report.

Many McKinsey colleagues provided valuable advice and analysis for this report, including Amit Ganeriwalla, Christian Hoffmann, Michel Van Hoey, Rajat Gupta, and Steven Vercammen. We thank the McKinsey Materials team and all the reviewers who added their insights.

We also thank our project team consisting of Adarsh Goutam, Anam Zia, Elango L, and Suneel Kumar. We are thankful to Pradeep M Kumar, Sarath Kumar, and Shikha Kaushik for designing this report, and to Anamika Mukharji, Fatema Nulwala, and Pranusha Chelikani for their communications support.

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Executive summary

Steel continues to anchor global infrastructure and industrial growth, but the sector is at a critical inflection point. Shifting demand centers, decarbonization imperatives, and volatile trade flows are redefining competitiveness. India and Southeast Asia (SEA) are emerging as the next engines of growth, with India poised to nearly double its steel demand by 2035.

The global steel industry: An evolving landscape

Steel's perennial role as a pillar of urbanization and industrialization faces mounting headwinds from chronic overcapacity, protectionist policies, and the uneven pace of decarbonization.

Global steel demand is projected to rise modestly from approximately 1,750 million metric tons in 2024 to between 1,850 million and 1,900 million metric tons by 2035, with most growth concentrated in India and SEA.[1] Meanwhile, China's apparent finished steel demand is projected to decrease from between 900 million and 950 million metric tons in 2024 to between 800 million and 850 million metric tons by 2035, driven by a structural slowdown in China's real estate and construction sectors.[2] China's increasing export surpluses are reshaping global trade patterns.

Trade measures in major steel markets have doubled since 2020, reflecting efforts by some regions, such as Europe, to safeguard domestic industries.

Raw material sourcing is likely to become complex, influenced by shifting demand patterns, regional decarbonization initiatives, evolving technology routes, and persistent supply-side risks. The shift in ore dynamics is reflected in the scrap market, where the competition for high-quality scrap is set to intensify.

How countries navigate the raw material constraints will depend on their decarbonization strategies. Europe is the frontrunner with the Emission Trading System (ETS) and Carbon Border Adjustment Mechanism (CBAM) frameworks. The US has made significant progress with emission reductions, but the challenge is to sustain it amidst policy uncertainty. China's approach has a moderate emphasis on subsidies and regulatory controls, as does India's strategy, which is still in the early stages of decarbonization.

India: Sustained growth amid evolving sustainability imperatives

For steelmakers, India is emerging as a key market with the potential to lead the way in future growth. Backed by resilient domestic demand, large-scale infrastructure investments, and favorable policy tailwinds, India's trajectory could reshape the steel narrative.

Structural drivers point to an improved demand outlook. India's steel consumption is expected to grow at a 5 to 6 percent CAGR, rising from approximately 150 million metric tons in 2025 to between 240 million and 260 million metric tons by 2035. Growth in the sector is expected to be driven by GDP expansion, a $1.4 trillion National Infrastructure Pipeline (NIP), and rising consumption from the renewable energy and defense sectors.

As a result, India's installed crude steel capacity of about 180 million metric tons in FY25 is set to grow, reaching between 260 million and 280 million metric tons by 2035.[3] Most additions support blast furnace (BF)–basic oxygen furnace (BOF)–based processes, which raise lock-in risks for carbon-intensive assets.

India's demand for steel is expected to be driven by the demand for high-grade steel from sectors such as automotive, renewables, and defense, which is accelerating the industry's structural shift toward downstream and value-added products. Looking ahead, downstream and value-added segments could account for an increasing share of both volume and value in the steel sector, reflecting the industry's strategic pivot toward higher value capture and end-user orientation. The next decade's investment cycles will test whether the sector's financial strengths can match its technological and environmental ambitions.

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1 World Steel Association; McKinsey Global Material Insights.
2 Integrated finished steel and metallics model, McKinsey MineSpans materials demand model, worldsteel.org.
3 Ministry of Steel, annual report 2024; BigMint; expert interviews.

Meeting emission targets could also play a significant role in shaping the domestic industry. In the near term, steel companies are reducing emissions by optimizing energy efficiency and leveraging process improvements in BF-BOF using measures such as installing control systems to reduce coke rate, optimizing slag chemistry setpoints, and increasing BOF gas capture. However, in the long run, several low-emission technologies, such as hydrogen-based Direct Reduced Iron (DRI), Carbon Capture, Use and Storage (CCUS), and near-zero emissions Electric Arc Furnaces (EAF), are being explored globally—but their readiness and cost structures remain uncertain in the Indian context.

Besides transition options, there is growing policy support to meet the decarbonization goals. India has introduced the Carbon Credit Trading Scheme (CCTS) in FY25, the National Green Hydrogen Mission (NGHM), revised Production-Linked Incentive 1.1 (PLI 1.1) for specialty steel, and end-of-life vehicle rules, targeting 18 percent recycled content by fiscal year 2036.[4] However, scaling is likely to demand deeper capital and more stringent transition mandates.

Capacity additions and decarbonization mandates could become indicators of how India navigates the supply of raw materials. India's iron ore equation is shifting from surplus to uncertainty. Although production of iron ore increased to around 280 million metric tons in 2024, growing demand could lead to an increased reliance on imports by 2035.[5]

Global demand for met coal, a critical raw material for BF-BOF steelmaking, is likely to decline by 1 to 2 percent due to falling demand from China, Europe, and the Commonwealth of Independent States (CIS).[6] However, with the addition of new BF-BOF-based steel capacities, India could lead the demand for seaborne met coal, growing from 72 million metric tons in 2023 to between 120 million and 130 million metric tons in 2035 (Exhibit 15).[7]

As Indian steelmakers pivot toward lower-carbon production routes, steel scrap is emerging as a critical, yet limited, resource. India consumed approximately 33 million metric tons of scrap in fiscal year 2024, of which 30 percent was imported.[8] By 2030, demand is estimated to be 50 million to 60 million metric tons, with a shortfall of 10 million to 15 million metric tons.[9]

Strategic imperatives for the Indian steel industry

As India advances its industrialization and infrastructure goals, achieving sustainable growth and maintaining global competitiveness could depend on strategic shifts—specifically, focusing on high-growth sectors, accelerating decarbonization efforts, securing raw materials, boosting competitiveness, and collaborating with the government.

To meet the evolving demands and ensure business sustainability, Indian steelmakers may need to assess and optimize their portfolios. Their focus will, most likely, turn to high-growth segments of the domestic economy, such as infrastructure, renewable energy, defense, and electric vehicles, while also maintaining access to stable export markets.

Building on this strategic adaptation, Indian steelmakers may be required to weigh their options toward decarbonization. The pathways for a low-carbon future include developing a roadmap for integrating low-carbon technologies such as NG/H2-DRI while enhancing energy efficiency in existing BF-BOF setups, securing long-term access to scrap, green power, and low-emission raw materials. Various funding options—including PLI schemes, concessional finance, and climate-linked instruments to offset decarbonization CAPEX—could be explored to chart the path to decarbonization.

Looking ahead, steelmakers could reimagine their supply chains to focus on reducing the reliance on imported met coal by focusing on domestic exploration, among other means, and shifting some of their capacity to EAF. They could also address cost-efficiencies by ensuring access to low-cost power and deploying Artificial Intelligence (AI) for quality control and predictive maintenance.

Overarching these imperatives is the collaboration with the government to improve logistics, enhance raw material resilience, strengthen quality frameworks, drive decarbonization, and improve India's competitiveness in high-end export markets.

Sustained value creation and global differentiation require targeted strategic pivots by steelmakers. Such actions can position India as a leading manufacturing hub and economic driver even amidst evolving geopolitical challenges and sustainability requirements.

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4 'Big changes ahead for Indian carmakers on recycling steel,' The Economic Times, January 14, 2025.
5 McKinsey materials team; expert discussions; IBM; SteelMint.
6 MineSpans by McKinsey, McKinsey analysis.
7 Indian Ministry of Commerce and Industry; MineSpans.
8 BigMint.
9 Ministry of Steel report; BigMint report.

01
The global steel industry: An evolving landscape

The global steel industry stands at an inflection point as shifting patterns of consumption, regulatory pressures, and economic realignments converge to reshape its future. Steel's perennial role as a pillar of urbanization and industrialization faces increased challenges from chronic overcapacity, trade friction, and the uneven pace of decarbonization. China, one of the world's largest steel suppliers, is experiencing a structural slowdown resulting from a weakening of urban development and real estate activity. Trade barriers are intensifying across many markets, including in the US, leading to a trend in regionalization and the redirection of supply chains. At the same time, rising energy costs and raw material imbalances are compressing margins, emphasizing the need for capital discipline and innovation. Amid these shifting currents, the race to decarbonize is accelerating, yet remains interrupted by execution delays and investment gaps, at a time when steelmakers must navigate a market that demands strategic recalibration.

Steelmaking remains a foundational driver of infrastructure development and economic growth. It is crucial to industries such as construction, automotive, machinery, and manufacturing. However, the global steel industry is entering a period of sustained transformation, catalyzed by emerging regulatory, macroeconomic, and market forces. Trade developments and the regionalization of supply chains and markets are redefining competitive dynamics. Simultaneously, inflation and energy costs are compressing margins and reshaping cost structures.

Shifting decarbonization priorities and increased challenges of raw material procurement further alter the landscape. Competitiveness, resilience, and capital allocation are all important priorities against this backdrop. As a more regionalized and dynamic steel landscape takes shape, companies in the industry are at a turning point – faced with the need to reimagine and recalibrate their strategies.

1.1. Shifting global demand patterns

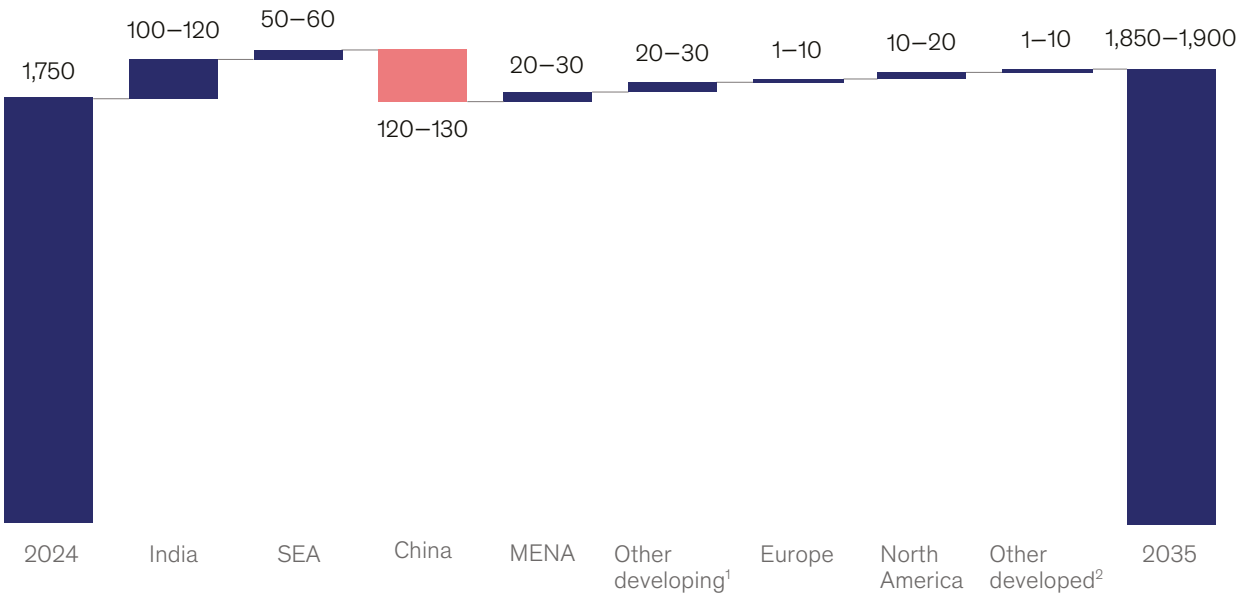
The global steel demand scenario is projected to grow from around 1,750 million metric tons in 2024 to between 1,850 million and 1,900 million metric tons in 2035, led by India and SEA.

As demand stabilizes or declines in traditional, mature markets, it could shift to emerging markets, moving the centers of demand growth. India is poised for robust growth, with demand likely to increase to between 100 million and 120 million metric tons by 2035. This surge will likely be fueled by infrastructure expansion, industrialization, and urbanization. While India emerges as a key engine for the growth in global steel demand, China's demand is beginning to plateau. China, historically the largest consumer of finished steel, could experience a decline of 120 million to 130 million metric tons by 2035, reflecting a structural shift toward a maturing infrastructure base and a sustained slowdown in real estate activity.

Exhibit 1

Global steel demand is expected to be driven by India and Southeast Asia.

Apparent finished steel demand, million metric tons



									Global growth
CAGR (%) 2024-2035	5–6	3–4	~-1	1–2	1–2	~1	~1	~1	~1

[1]CIS, Latin America, Sub-Saharan Africa.
[2]Japan, South Korea, Taiwan, Hong Kong, Australia and New Zealand.
Source: World Steel Association, McKinsey Global Material Insights

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1.2. China's demand transition and evolving export dynamics

China's apparent finished steel demand is expected to decline at a CAGR of –0.8 percent between 2024 and 2035, primarily due to a slowdown in the construction sector, which is likely to decrease by 2 percent annually until 2035, resulting from weakening urban development and real estate activity. (Exhibit 2).

Historically, China used production controls to manage exports, but the playbook is now evolving. From 112 million metric tons of exports in 2015, finished steel exports dropped to 54 million metric tons in 2020 as the government controlled capacity, eliminated tax incentives, and the industry faced increasing trade barriers (Exhibit 3). However, since 2020, China's domestic slowdown has been translating into higher exports, with developing Asia accounting for 53 percent of the total exports and South America for 15 percent in 2024.[10]

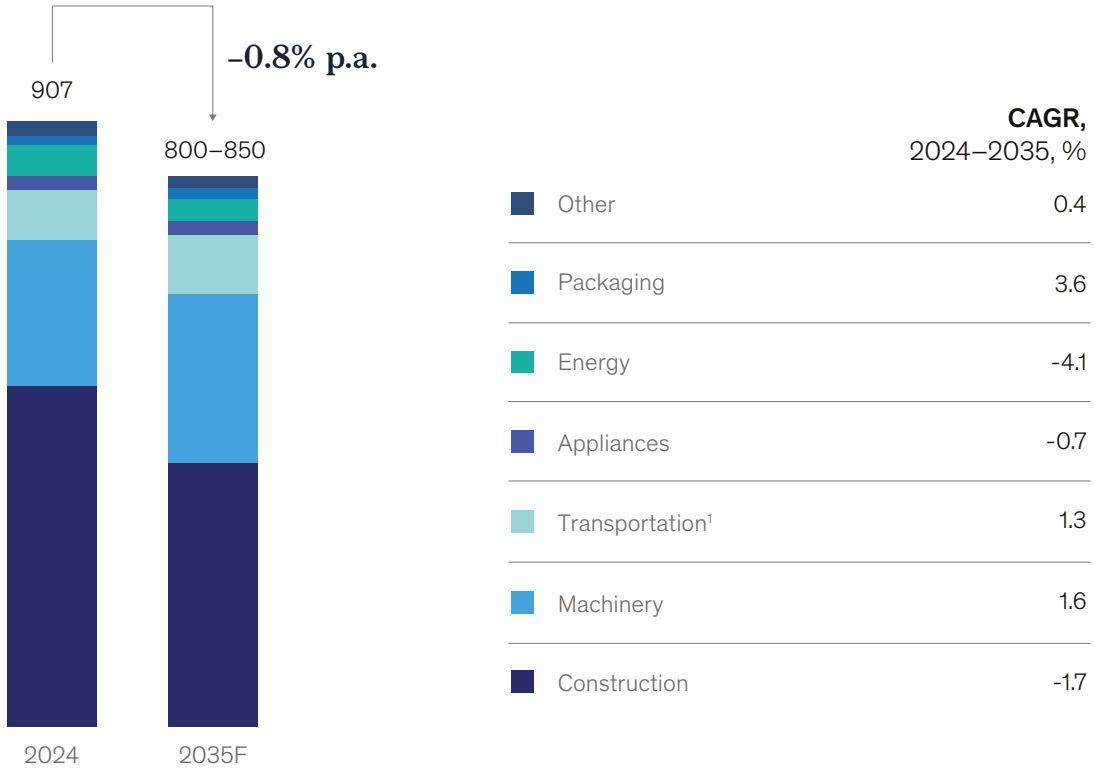
China's steel exports will likely depend on four factors: Looking ahead, the trajectory of China's steel exports will likely be shaped by the interplay of four interconnected forces: a contraction in domestic construction activity, production cuts, trade policies, and export economics.

The persistent structural slowdown in the real estate and construction sectors suggests that domestic steel demand is unlikely to experience a meaningful rebound soon. Further, the government has proposed a 5 percent reduction in steel production, though the actual implementation of these cuts remains uncertain.[11] As a result, surplus steel is being diverted to international markets. Along with this, export premiums in China remain consistent at $40 to $50 per ton, providing a strong economic incentive for mills to prioritize exports despite challenging conditions.

Exhibit 2

Steel demand in China is expected to decline, mainly driven by the slowdown in the construction sector.

China's apparent finished steel demand by sector, million metric tons



[1]Auto vehicle, shipbuilding.
Source: Integrated finished steel and metallics model, McKinsey MineSpans materials demand model, worldsteel.org

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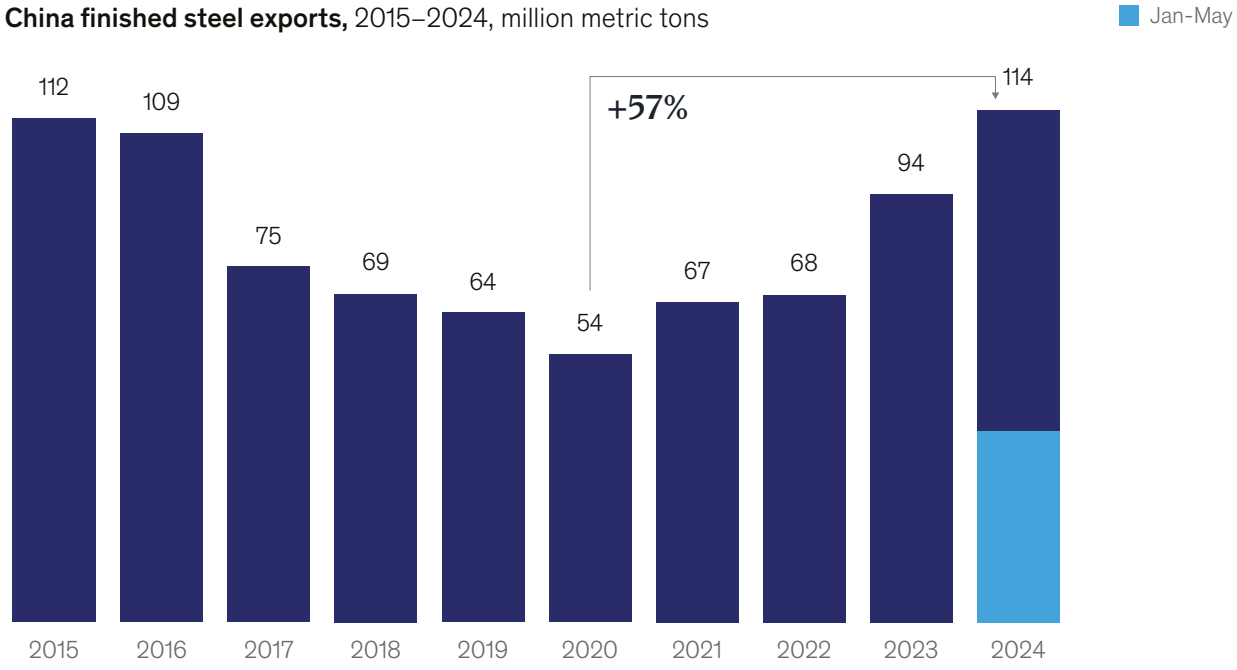
[10] MySteel, McKinsey ISSB steel trade flow model.
[11] China plans steel output cuts but production may rise as trade tensions ease, S&P Global, May 14, 2025.

Exhibit 3

Exports rebounded due to a decline in steel demand and growing oversupply in China.

China finished steel exports, 2015–2024, million metric tons



Source: Mysteel, worldsteel.org, McKinsey GMI

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Implications for global steel markets: China's structural demand slowdown could lead to continued export overhangs, exerting pressure on margins in other regions. For global producers, this underscores the importance of accelerating value-added differentiation, investing in trade-resilient products such as certified low-carbon steel, and preparing for increased protectionism. For Indian producers, the risk is two-fold: heightened import competition and volatile pricing, both requiring a sharper focus on domestic cost competitiveness and downstream integration.

1.3. Trade policies and market regionalization

The shifting export dynamics are unfolding against a backdrop of evolving global trade policy. Evolving policy frameworks are not merely reshaping where steel flows, but are also influencing how markets set prices and manage supply.

The global steel raw-materials trading ecosystem has undergone significant structural shifts, catalyzed by a significant increase in trade measures over the past several years. For example, Section 232, first implemented in 2018, set a 25 percent duty on imported semi-finished and finished steel and aluminum products. Following its introduction, U.S. steel imports declined below 2017 levels, and capacity utilization at domestic mills rose, at times nearing the administration's target of 80 percent.[12]

In 2025, trade measures under Section 232 on steel and aluminum products were raised from 25 percent to 50 percent. The scope was further broadened to include a range of steel-derivative household appliances, such as refrigerators, freezers, dishwashers, and stoves, with duties applied to the steel content of these products.[13]

From 2020 to 2025, the incidence of such trade measures has doubled (Exhibit 4). The policy interventions encompass an array of measures, including import quotas, licensing requirements, technical barriers, anti-dumping duties, and export restrictions. The cumulative impact has been significant, altering established price discovery mechanisms and trade flows.

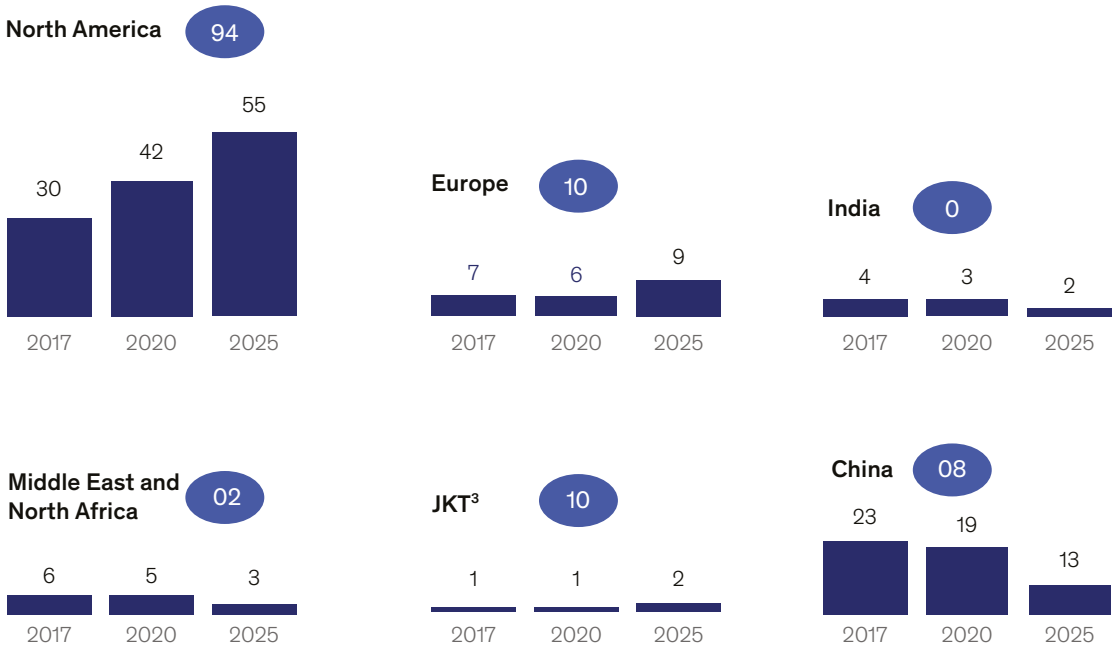
[12] AISI Yearbook, USGS, EIA, US International Trade Commission, McKinsey Analysis, Economic Policy Institute,Citi Group Report on Steel Lesson, CNN.
[13] U.S. Federal Register, Public Inspection Document No. 2025-11067 (June 2025).

Exhibit 4

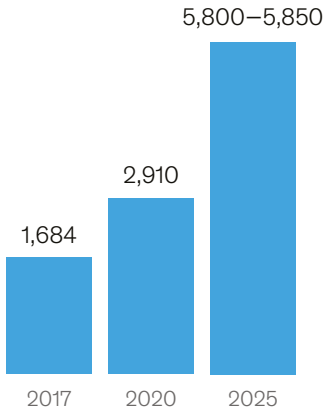
Proliferation of trade restrictions has created regionalized pricing walls.

Overview of trade restrictions related to carbon steel products[1,2], by inception year and in force, share in global restrictions, %

XX # of new restrictions introduced in 2025



Global trade restriction, number



[1]Related to: import ban, import licensing requirement, import monitoring, import quota, import tariff, import tariff quota, internal taxation of imports and import-related non-tariff measure, anti-dumping measures, export ban, export licensing requirement, export monitoring, export quota, technical barrier to trade, safeguards and other measures.
[2]All codes under HS 72. Semis: HS code 7207; Flat: HS codes 7208, 7209, 7210, 7211, 7225, 7226; Long: 7213, 7214, 7215, 7216.
[3]JKT: Japan, Korea, Taiwan.
Source: GTA DATABASE (April 2025)

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1.4. Raw material sourcing constraints

Raw material sourcing could become an increasingly complex challenge for the steel industry, influenced by shifting demand patterns, regional decarbonization initiatives, evolving technology routes, and persistent supply-side risks. While global demand for metallics is steadily rising, the mix is transitioning toward more sustainable sources with increased use of scrap and DRI and a declining reliance on hot metal (Exhibit 5). This reflects broader trends in decarbonization and circularity within the steel industry.

1.4.1. Decline in met coal consumption

One of the clearest indicators of the changes underway in the metallics mix is its impact on coal. As steelmaking moves toward cleaner inputs, the outlook for met coal is undergoing a marked transformation.

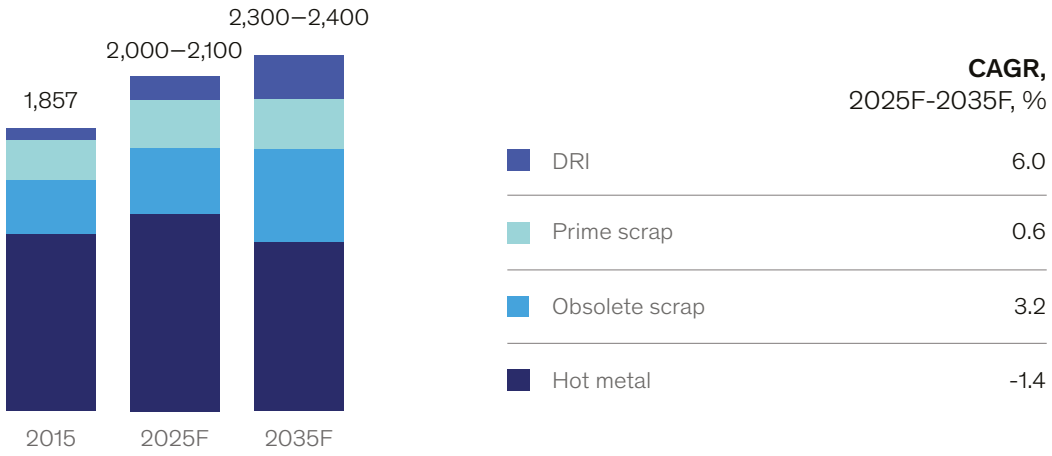
Global met coal demand is expected to decline by 1 to 2 percent annually until 2035, driven by various factors, including reduced demand from China, steelmaking's shift to non-coal-based technologies in response to increasing scrap generation, and the push for decarbonization, including coal phase-out commitments (Exhibit 6). Additionally, using scrap steel in production could likely increase, further reducing the demand for met coal. India and SEA's demand could continue to grow due to ongoing urbanization and the continued dependence on met coal for pig iron production. Europe's ambition to decarbonize the steel industry could decrease the demand for pig iron production and reduce the demand for met coal.

While demand for met coal is likely to decline in line with decarbonization trends gradually, supply could contract faster. Future supply remains uncertain as existing mines deplete, the project pipeline is thin, and financing for coal projects is increasingly constrained. Although new projects such as Blue Creek (USA), Centurion (Australia), and Quintette (Canada) are expected to ramp up production in the next three years, these additions are unlikely to offset broader structural headwinds.[14] With the seaborne share of hard coking coal likely to fall from about 68 percent today to about 60 percent by 2035,[15] the market is at risk of moving into structural undersupply, keeping prices elevated despite moderating demand.

Exhibit 5

Decarbonization and growth in scrap availability could drive a significant shift in metallics usage toward more scrap and DRI.

Global metallics consumption forecast, million metric tons



Source: Integrated finished steel and metallics model, team analysis

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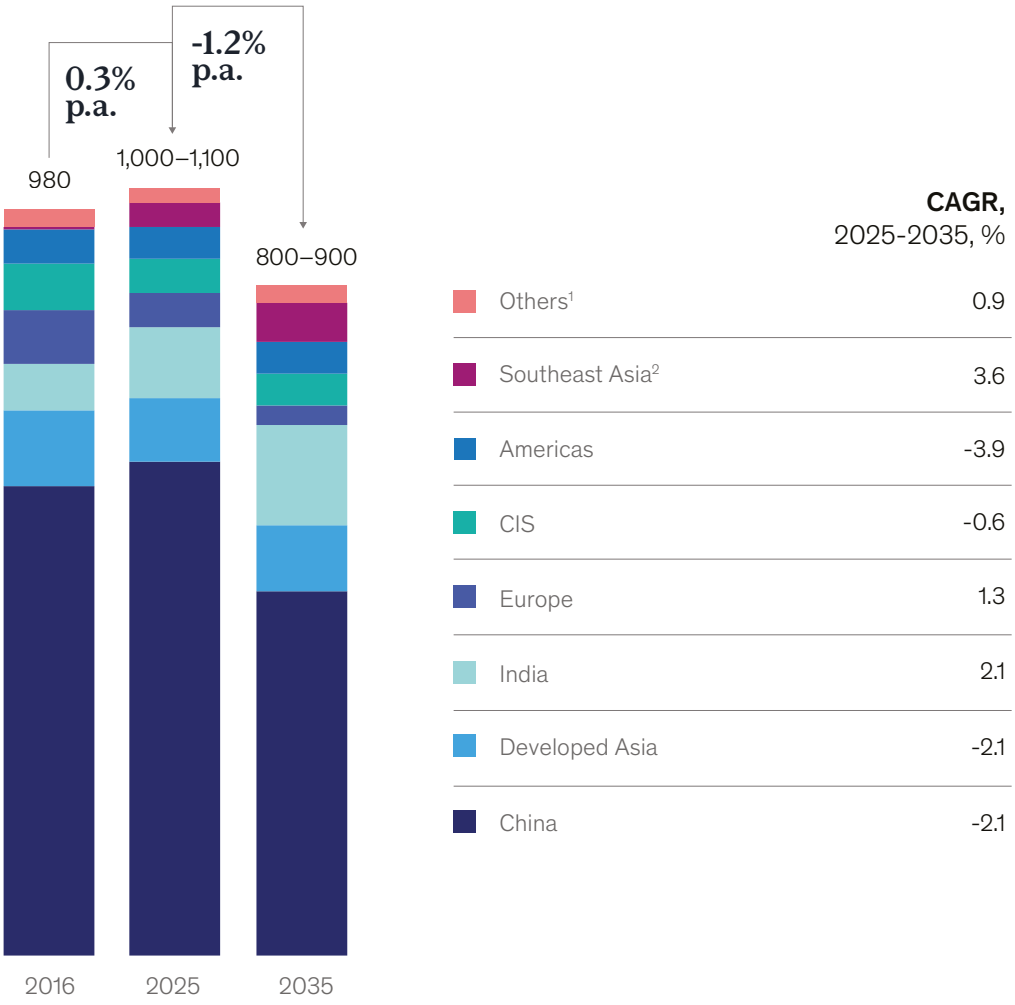
[14] Warrior Met Coal, February 21, 2025; Blue Creek Project update. U.S. Investor Relations. Independent Expert Scientific Committee (IESC), June 2022; Vickery Coal Mine – Vickery Extension Project (Vickery Extension), Production rate increases from 4.5 Mtpa to 7.2 Mtpa, British Columbia Government, May 22, 2025; Quintette Mine – Restart of operations, Environmental Protection Notice, Application No. 428605, British Columbia Gazette.

[15] MineSpans by McKinsey.

Exhibit 6

Met coal demand is expected to decline by ~1% by 2035 as the metallics mix shifts to DRI and scrap.

Metallurgical coal consumption by region, global, million metric tons



[1]Others include MENA, Sub-Saharan Africa and Oceania.
[2]Sotheast Asia incluses Indonesia, Malaysia, Philippines, Thailand and Vietnam.
Source: McKinsey GMI

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1.4.2. Iron ore supply-demand imbalances

Decarbonization and shifting technology routes are starting to redraw the balance between supply and demand. The coming decade could determine the type and quantity of ore the industry will demand.

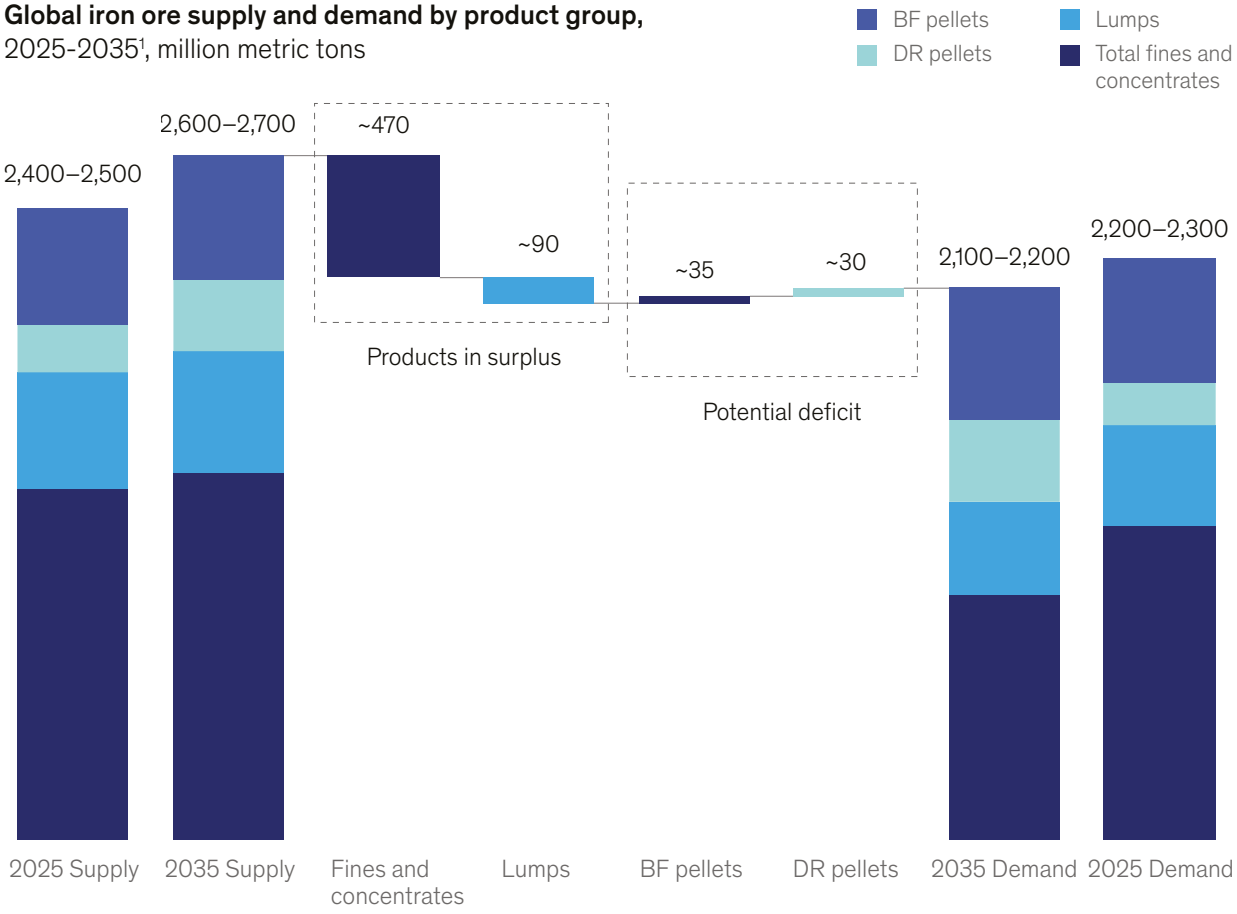
A global surplus in iron ore supply is likely to develop by 2035, with total supply expected to reach approximately 2,600 million to 2,700 million metric tons. This supply growth is anticipated to outpace demand, which is likely to decline to between 2,100 million and 2,200 million metric tons during the same period. However, this overall potential surplus of nearly 500 million metric tons masks significant imbalances across product segments (Exhibit 7). BF-grade iron ore and fines could remain oversupplied due to declining global sinter demand and a growing preference for blast furnace pellets. DR-grade pellets are likely to face a shortage of approximately 30 million metric tons by 2035, as supply growth could lag behind rising demand unless new capacity additions are expedited.

In this context, the development of Simandou—a massive high-grade iron ore deposit in Guinea—assumes strategic importance. With the potential to add over 110 million metric tons of supply, Guinea is poised to become the third-largest global exporter after Australia and Brazil, reshaping trade flows and price dynamics. While the additional

Exhibit 7

The high-grade DR pellet market could enter a potential deficit if no new supply is announced.

Global iron ore supply and demand by product group, 2025-2035[1], million metric tons



[1]The demand number does not account for transport losses and non-metallurgical uses (or demand only for steel). Historically, supply and demand are difficult to compare due to uncertainty in trade data for some regions.
Source: McKinsey GMI iron ore demand model, MineSpans

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volume could exacerbate oversupply in BF-grade markets and place downward pressure on global prices—especially impacting high-cost producers—it also offers a partial solution to the emerging shortage of DR-grade feedstock. However, converting Simandou ore into usable DR pellets for shaft furnaces may require further investment in pelletizing infrastructure. Europe could experience some price relief, but the ore's coarseness might restrict adoption.

1.4.3.Scrap availability constraints for EAF expansion

The shifting ore dynamics are mirrored in the scrap market, where technology change is redefining what constitutes a 'critical' steelmaking feedstock. As EAF and DRI gain ground, the competition for high-quality scrap is set to intensify, leading to shortfalls.

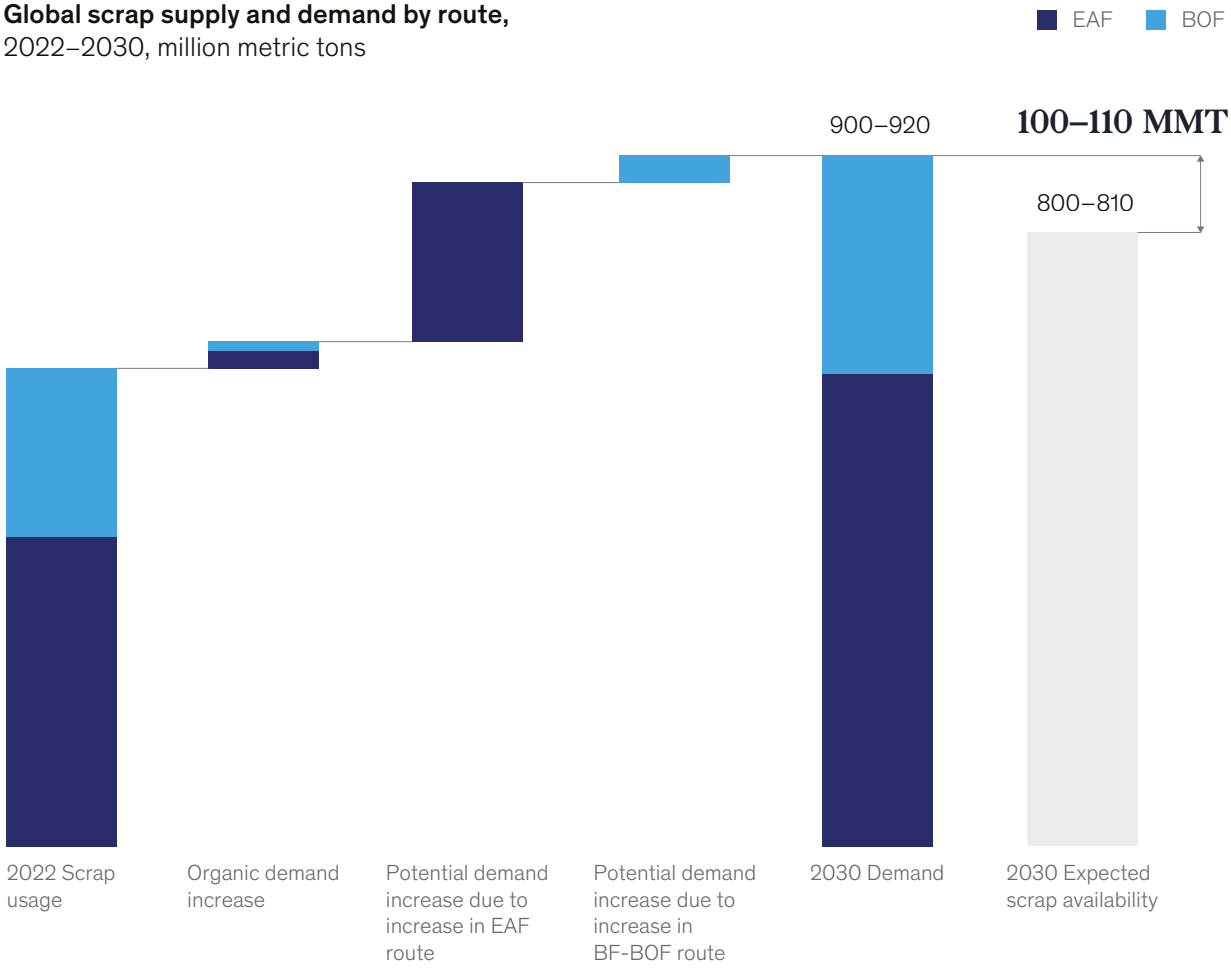
As the steel industry pivots toward increased use of EAF and DRI, particularly in Europe, North America, and parts of Asia, steel scrap is becoming a critical input. Global external scrap demand is expected to grow to between 900 million and 920 million metric tons by 2030, driven by rising steel demand, growing EAF penetration, and increasing use of scrap in BOF (Exhibit 8). However, at current reclamation and processing rates, scrap availability is expected to increase to approximately 800 million to 810 million metric tons, potentially leading to a global supply shortfall of 100 million to 110 million metric tons by 2030 (Exhibit 8).

As exporting countries channel more scrap into their own decarbonization pathways, less volume may be available in the open market, leaving import-dependent producers with volatile input costs and tighter physical supply.

Exhibit 8

100–110 million metric tons of scrap supply shortfall is expected vs demand in 2030.

Global scrap supply and demand by route,
2022–2030, million metric tons



Source: Worldsteel.org

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These trends suggest that access to low-cost or captive scrap could become a critical differentiator for countries and companies pursuing EAF-based decarbonization. This may accelerate investments in scrap collection systems, cross-border trade agreements, or hybrid feedstock strategies combining scrap with hot metal or DRI. A parallel opportunity lies in upcycling obsolete scrap recovered from end-of-life vehicles, appliances, and construction materials. With advanced sorting and refining technologies, obsolete scrap can be upgraded to higher-quality inputs, expanding the usable scrap pool and reducing reliance on prime grades.

1.5. Decarbonization under regulatory and market pressure

How countries navigate these raw material constraints is likely to depend as much on decarbonization plans as on market forces. Decarbonization strategies are unfolding unevenly, shaped by the mix of incentives, regulations, and consumer response in each region.

Steel decarbonization efforts vary significantly across regions, shaped by differing levels of policy support, market demand, and regulatory pressure. Europe has been the frontrunner in driving both incentives for low-carbon steel, such as customer demand from end-user industries and recycled content requirements, and deterrents for gray steel, for example, ETS and CBAM.

North America hinges on sustaining momentum amid shifting policy signals and uncertain long-term incentives. At the same time, China's approach has moderate emphasis on subsidies and emerging regulatory controls, but a

relatively limited market and financial push. India is in the early stages of the decarbonization momentum through regulatory efforts and subsidies, though broader market and institutional drivers remain less mature.

1.5.1. Europe's low-carbon steel transition

Europe's decarbonization efforts have been uneven. Even with generous subsidies and regulatory tailwinds, the path from announcement to commissioning remains strewn with financial and technical obstacles.

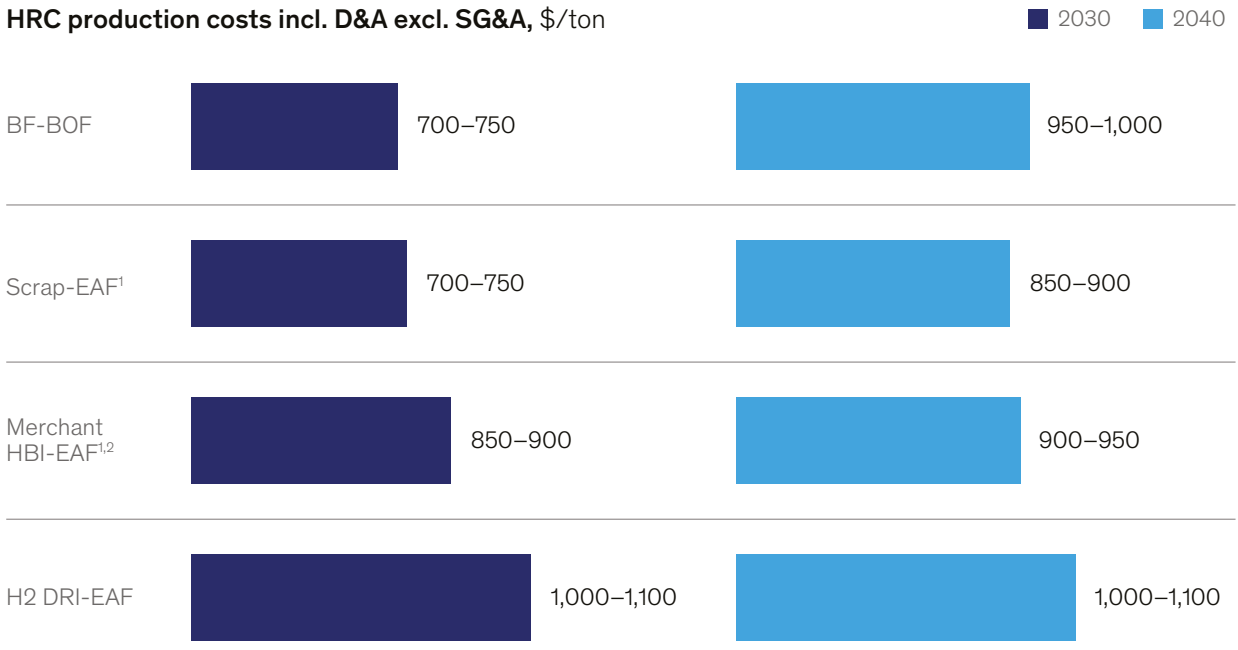
Europe leads in announcing low-carbon steel capacity, but turning plans into reality has been slow at the beginning of 2025. Only 40 percent of projects had reached the basic engineering or equipment ordering stages, and just 15 percent had started construction, signaling major execution hurdles. While two-thirds of projects have started securing funds, only one-fourth have secured full funding. Over 60 million metric tons of planned low-carbon steel capacity is delayed due to high CAPEX and OPEX costs, market instability, and limited customer willingness to pay green premiums.[16]

BF-BOF remains the cheapest production route today, with costs around $700 per ton (Exhibit 9). The competitiveness of steelmaking routes may rely on the availability of raw materials and energy prices. For instance, by 2040, Central Europe's most competitive steelmaking routes could be scrap-EAF at about $880 per ton and merchant HBI-EAF at about $920 per ton from low-cost Middle Eastern producers. Carbon costs erode BF-BOF economics, while high energy prices in parts of Europe with currently significant steelmaking capacity make domestic hydrogen and natural gas (NG) DRI costly. In contrast, the Nordics benefit from abundant low-cost renewable energy, making hydrogen-based DRI-EAF the most competitive steelmaking route by 2040.

The European Union (EU) is also reshaping the economics of steelmaking through its carbon framework. The EU Emissions Trading System (ETS) was rebased in 2024, with steeper annual reductions that raise compliance costs for carbon-intensive BF-BOF operators.[17] From 2026 to 2034, the free allocation of allowances could decline sharply, removing a key source of industry protection.[18] In parallel, the Carbon Border Adjustment Mechanism (CBAM),

Exhibit 9

Central EU: Merchant HBI routes are expected to be more competitive than captive DRI and BF-BOF.



[1]Merchant HBI includes H2 and natural gas HBI.
[2]Cost including CAPEX for new HBI plant built in Oman/Saudi Arabia or Brazil, operating cost to produce HBI, and freight to Central Europe.
Source: Green steel TCO model

McKinsey & Company

[16] McKinsey Low carbon steel monitor, Fastmarkets.
[17] International Carbon Action Partnership (ICAP), EU: European Union Emissions Trading System (EU ETS), ICAP, 2024.
[18] International Carbon Action Partnership (ICAP), EU Adopts Landmark ETS Reforms and New Policies to Meet 2030 Target, ICAP, 2023.

currently in a reporting-only phase, will require importers to purchase certificates from 2027.[19] Together, these policies align carbon costs for both domestic and imported steel, reinforcing competitiveness on climate terms.

1.5.2. Decarbonization pathways in the US

Across the Atlantic, the picture looks different. While Europe's challenge lies in bridging the gap between ambition and delivery, America's hinges on sustaining market momentum amid shifting policy.

Decarbonization momentum in the US is shaped by shifting trade and industrial policies, evolving financial support structures, and uncertainty around long-term incentives. While the US has emerged as the world's greenest steel market driven by accelerated adoption of EAF technology, with 69.2 percent of steel produced via EAFs in 2021 versus 28.9 percent globally, its key challenge is sustaining this progress amid policy uncertainty, whereas in Europe the gap lies in translating ambitious targets into delivery.[20]

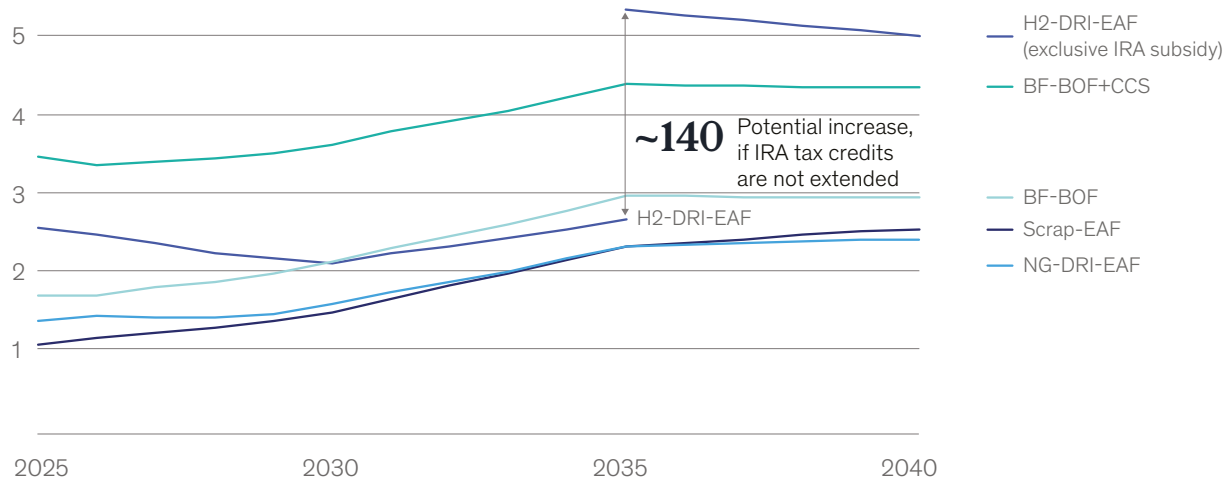
Several low-CO_2 steelmaking technologies have already reached cost parity with conventional BF-BOF methods. Specifically, Scrap-EAF and NG-DRI-EAF are currently competitive on crude steel cost, providing a strong economic case for immediate and scalable decarbonization using existing technologies. The transition is being aided by favorable market conditions, namely low natural gas prices, low scrap costs, and improved domestic capabilities in producing flat steel from scrap.

Advanced decarbonization routes, such as H_2-DRI-EAF and BF-BOF with Carbon Capture and Storage (CCS), remain more expensive. H_2-DRI-EAF is highly sensitive to policy incentives; its competitiveness relies on the continuation of IRA tax credits in the US. Should these credits not extend beyond 2035, production costs could increase by approximately $140 per ton, threatening commercial viability (Exhibit 10). Thus, while some low-carbon steel pathways are economically viable today, the adoption of more advanced technologies would continue to depend on policy support and market conditions.

Exhibit 10

North America: Low-CO2 technologies are already at cost parity with BF-BOF, except for H2-DRI-EAF and CCS.

Crude steel cost[1] for different technologies in the US, $/ton



[1]Including annualized CAPEX and capital cost for NG-DRI, H2-DRI, and CCS; operating cash cost; excluding SG&A, state aid, other financial and interest costs.
Source: McKinsey green steel cost model

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[19] European Commission, 2023; Sandbag, 2024.
[20] Short Span Steel Bridges, Leadership of the American Steel Industry in the Green Economy (Short Span Steel Bridges, 2023).

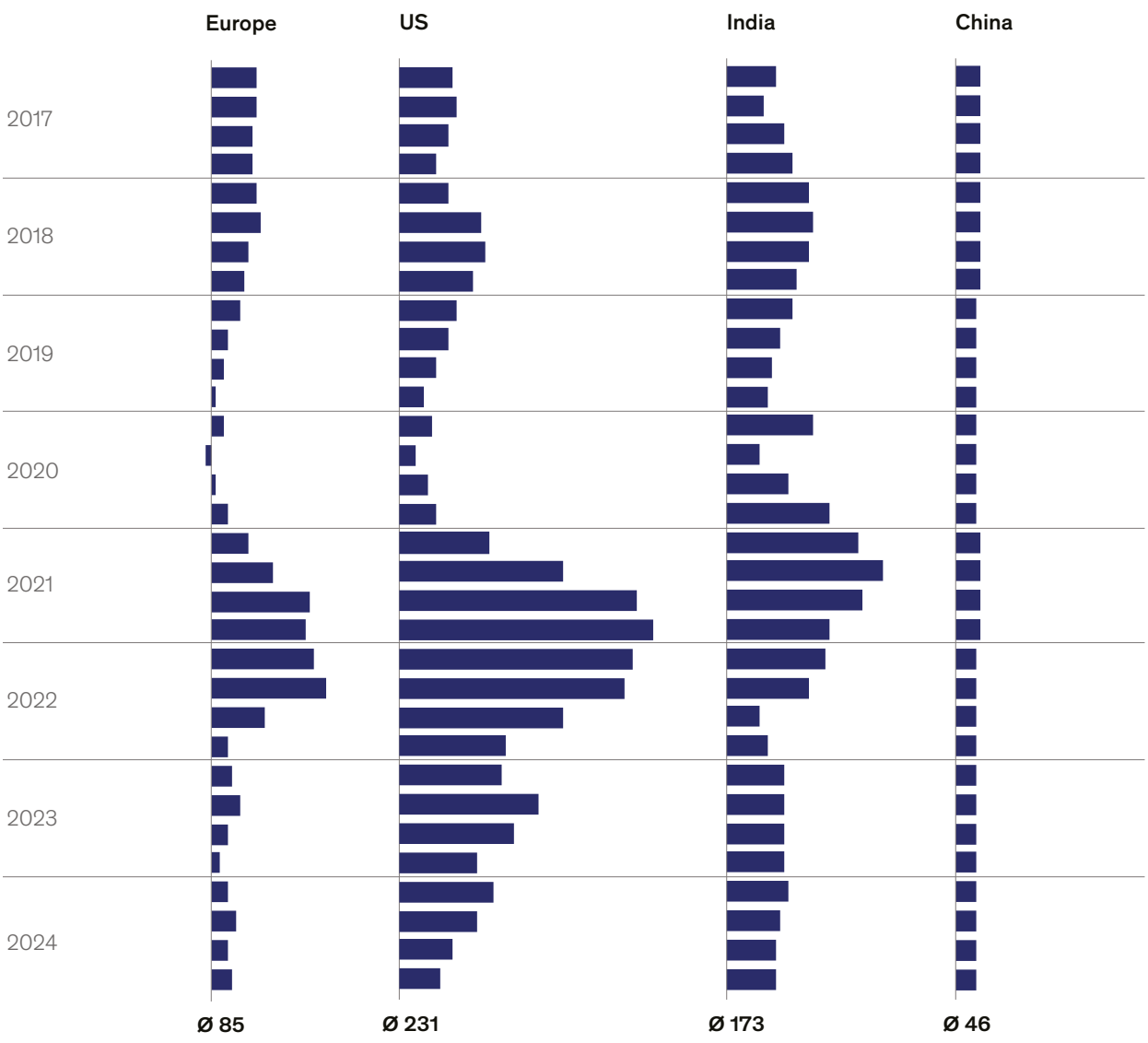
1.6. Margin and profitability challenges

The steel industry has seen low margins since the second half of 2022. Quarterly margins in Europe, China, and India have been lower than long-term averages (Exhibit 11). As countries increase exports to address domestic surplus capacity, margin pressures may persist globally, including in India.

Exhibit 11

Steel margins have been under pressure, more in Europe and China.

Quarterly EBIT(DA) margin[1] (weighted average for major steel companies in each region)
2017–2024, $/ton



[1]Weighted average for major steel companies in each region/ mainly flat steel business units. For China, EBIT numbers normalized to EBITDA by assuming $40/t of depreciation and amortization.
Source: Company quarterly reports, Federal Reserve Bank of St. Louis

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02

India: Sustained growth amid evolving sustainability imperatives

While global steelmakers navigate a period of muted demand growth and compressed margins, India, with its growing demand, shows steady signs of maintaining its position as one of the fastest-growing steel demand markets.

India's steel sector is in an accelerated growth phase, with demand expected to grow at a 5 to 6 percent CAGR through 2035.[21] In response, producers are committing to significant capacity additions alongside downstream integration. Rising government infrastructure spending, PLI scheme and growth in renewables and defense, is driving the sector's production output.

This growth, however, is being built on the lowest-cost but carbon-intensive BF-BOF route, which dominates India's young steelmaking asset base. Decarbonizing these assets is challenging given their long remaining life, heavy reliance on imported coking coal, limited availability of high-grade iron ore, and scrap shortages. Lower-carbon pathways such as green hydrogen-based DRI or CCUS remain far more expensive, requiring significant infrastructure investments, abundant renewable power, and supporting ecosystems that are still nascent. These factors will significantly shape the pace and direction of the sector's transition.

The following sections of the report examine the key themes shaping the Indian sector's outlook: structural demand drivers, the scale and nature of CAPEX underway, the transition challenges and trade-offs involved in decarbonization, and the evolving constraints.

[21] World Steel Association; JPC Report; McKinsey integrated steel demand model.

2.1. Structural drivers point to improved demand outlook and sustained growth

The pace and scale of India's growth depend on how it navigates the structural challenges. Early signals indicate that public policy and industry investment are moving in tandem. This is creating a foundation for demand-driven expansion, ensuring that India can remain one of the world's fastest-growing steel demand markets, with consumption expected to reach about 240 million to 260 million metric tons by 2035. This outlook is anchored by robust macroeconomic growth, rapid urbanization, government-led domestic infrastructure expansion, a shift toward value-added products, and sector-specific growth nodes such as defense and renewables (Exhibit 12).

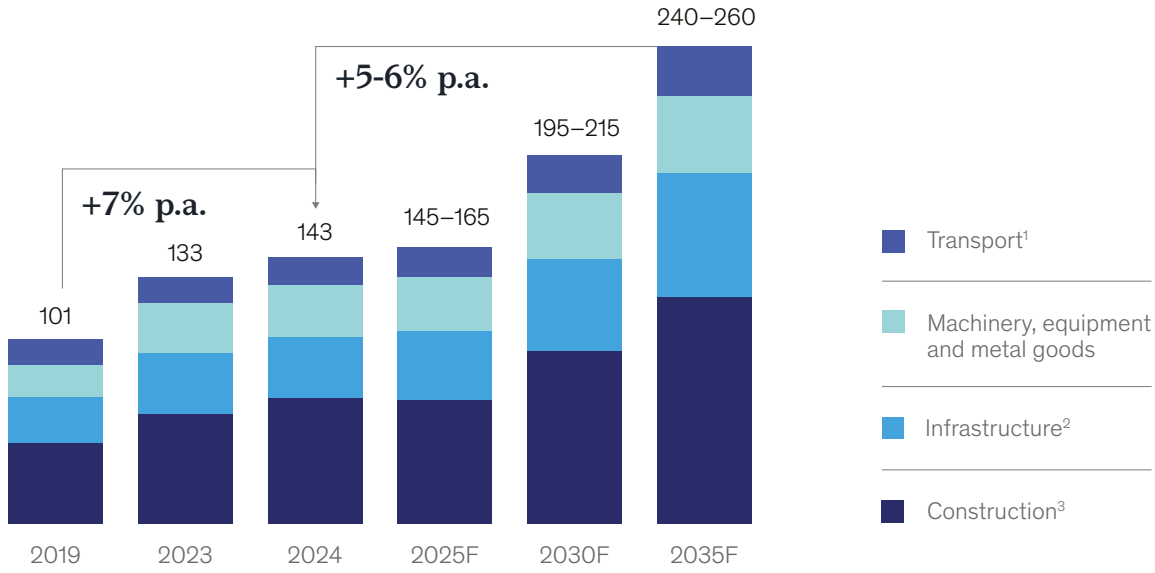
2.1.1. Steel demand is supported by economic growth, policy initiatives, and high-growth sectors

India's steel demand outlook is supported by its rapid economic growth, urbanization, and policy initiatives. Infrastructure remains the backbone of growth, with the $1.4 trillion NIP (fiscal years 2020 to 2025) supporting programs such as Bharatmala, Sagarmala, and Gati Shakti.[22] For fiscal year 2025–26 alone, the government has set a target of 10,000 km of new highways and approximately $32 billion of investment in railways.[23] Construction GVA is expected to expand by 5.5 to 6 percent annually through 2035, fueled by industrial corridors, housing, and commercial real estate.[24] Vehicle sales are expected to grow at a 5 to 6 percent CAGR until 2029, supported by rising incomes and PLI schemes for automotive, appliances, and industrial equipment.[25] To safeguard domestic producers, the government imposed a 12 percent duty on select flat steel imports from China and Vietnam in April 2025.[26]

Exhibit 12

Infrastructure investments and growing consumption are expected to drive demand across sectors.

India's apparent finished steel demand,
million metric tons



[1]Auto including 2W, 3W, 4W, LCV, M&HCV, Tractors and Cycle.
[2]Includes energy & power including renewables, airport, ship port, railways, roads and bridges among others.
[3]Includes residential, commercial and industrial construction.
Source: World Steel Association, McKinsey integrated steel demand model

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[22] A strong V-shaped recovery of economic activity, Ministry of Finance, Press Information Bureau, January 2021; National Infrastructure Pipeline, Ministry of Commerce and Industry, Government of India.
[23] `Government targets creation of 10,000 km of national Highways for 2025-26, lowest in seven years,' The Economic Times, February 26, 2025; Dhruvaksh Saha and Shine Jacob, 'Budget: Railway capex stays flat; revenue receipts set to cross Rs 3 trn,' Business Standard, February 2, 2025.
[24] IHS Markit.
[25] CMIE Data.
[26] Centre imposes 12% safeguard duty to shield Indian steel sector, Ministry of Steel, April 21, 2025.

Beyond traditional drivers, steel demand is rising in renewables and defense. India's clean energy buildout—targeting 500 GW by 2030—will require substantial steel:[27] about 35 to 45 tons per MW of solar, about 50 tons for onshore wind, and up to 300 tons for offshore wind.[28] Demand from renewables is expected to grow from 2.8 million metric tons in 2025 to 4.8 million metric tons by 2035, with half of this growth coming from solar PV.[29] Defense and aerospace, while smaller in share, are growing, with needs for high-grade steels in military assets. Domestic capability is strengthening, though overcoming MOQ constraints and building fabrication/testing ecosystems remain critical.

Together, strong macroeconomic tailwinds, infrastructure execution, policy incentives, and emerging high-growth sectors are expected to drive robust, resilient, and increasingly specialized steel demand through 2035.

2.1.2. The industry's shift toward value-added and downstream products

The rising demand for high-grade steels from sectors such as automotive, renewables, and defense is accelerating the industry's structural shift toward downstream and value-added products. Indian steelmakers are expanding capacity in cold-rolled, coated, high-strength, and electrical steels to meet evolving end-user requirements while capturing higher margins. Over the past five years, independent downstream operators have sustained healthy EBITDA margins of 7 to 18 percent, supported by product differentiation and technical service offerings.[30]

Despite progress, domestic supply gaps persist in select high-specification grades, particularly automotive and electrical steels, resulting in continued import dependence. The PLI scheme for specialty steel was introduced in 2021 and revised in 2024 with lower entry barriers and MSME-friendly terms.[31] It seeks to boost domestic output of coated, electrical, and alloyed grades, reducing import reliance and strengthening supply chains.

Looking ahead, downstream and value-added segments could account for an increasing share of both volume and value in the steel sector, reflecting the industry's strategic pivot toward higher value capture and end-user orientation.

2.2. India's capex plans to meet rising demand

India's steel industry is entering a critical phase of capital deployment. While large-scale capacity additions are underway, they mainly focus on conventional BF-BOF routes, raising concerns around asset lifespan, financing requirements, and decarbonization risks.

2.2.1. Capacity pipeline and growing production reshaping the outlook

India has an installed crude steel capacity of about 180 million metric tons per annum as of fiscal year 2025. Capacity is expected to rise substantially, reaching 260–280 million metric tons in line with increasing demand, with the bulk of this growth expected to come from the BF-BOF route (Exhibit 13).

This shift reflects the commissioning of a large pipeline of integrated BF-BOF capacity, supported by favorable project economics, scale efficiencies, and existing raw material linkages. This trend suggests that coal-intensive BF-BOF infrastructure will continue to dominate India's production mix, unless new investments actively shift toward lower-emission technologies.

2.2.2. Changing capital requirements and investment decisions

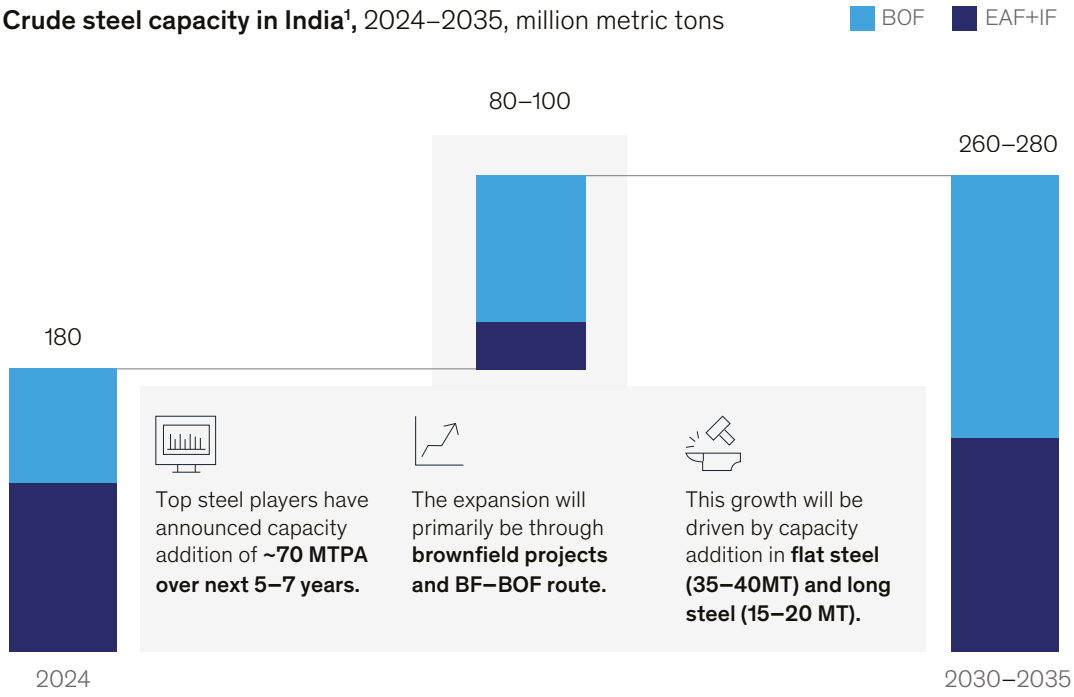
The sector is making strides toward meeting its large-scale capacity expansion needs, supported by two key shifts. First, the industry is expected to consolidate further, with the top five steelmakers increasing their capacity share by fiscal year 2031.[32] Second, sector leverage remains at historically comfortable levels, suggesting improved financing capacity. India's production trajectory is likely to require both capital mobilization and disciplined execution. India's production trajectory will require capital mobilization and disciplined execution. The next decade's investment cycle will test whether the sector's financial strengths can match its technological and environmental ambitions.

[27] India's Renewable Rise: Non-Fossil Sources Now Power Half the Nation's Grid, Ministry of New and Renewable Energy, July 14, 2025; India's Renewable Energy Capacity Hits New Milestone - Renewable energy now constitutes more than 46.3% of total capacity, Ministry of New and Renewable Energy, November 13, 2024.
[28] Steel Thoughts: Underpinning Europe's renewable energy revolution, ArcelorMittal, 2024.
[29] McKinsey, India steel model.
[30] CapitalIQ, Crisil.
[31] Government notifies revised PLI Scheme 1.1 for Specialty Steel, Press Information Bureau, January 6, 2025.
[32] Mordor Intelligence.

Exhibit 13

Capacity is expected to rise, with expansion likely to be supported by the BF-BOF route.

Crude steel capacity in India[1], 2024–2035, million metric tons



[1]Primarily based on announcements which may get delayed beyond 2030.
Source: Ministry of Steel, annual report 2024, BigMint, expert interviews

2.3. India balances scaling up with low-carbon transition

As global pressure mounts to decarbonize, India's steel industry faces a unique dual challenge. First, it would need to meet rising domestic demand while aligning with long-term climate goals, even while most of the country's upcoming capacity is still coal-based, making the sector one of the most emissions-intensive worldwide. Second, structural constraints, such as reliance on coal-based DRI, limited access to natural gas, and dependence on thermal power, further complicate the transition.

Overcoming these challenges requires a phased transition, supported by innovation, investment, and enabling regulation. Consequently, emerging solutions like hydrogen and CCUS could play a key role after 2035.

2.3.1. Emissions intensity shapes technology considerations

The scale-up is unfolding amid intensified climate scrutiny. How India decides to balance its capacity ambitions with the imperative to curb emissions will play a significant role in shaping the steel sector's global competitiveness for decades.

The steel production landscape in India is still dominated by BF-BOF technology, which is both carbon- and capital-intensive. Adding to this challenge is the scarcity of high-grade iron ore, as a significant portion of domestic reserves are medium- to low-grade ore, requiring energy-intensive beneficiation and blending processes. The industry's reliance on thermal power for electricity generation, along with the widespread use of high-ash domestic coal in the DRI process, further constrains opportunities to enhance process efficiency and reduce carbon emissions. Scaling up alternatives like gas-based DRI is hampered by limited access to natural gas and ongoing challenges with supply reliability and pricing.

In the near term, steel companies are reducing emissions by optimizing energy efficiency and leveraging process improvements in BF-BOF using measures such as installing control systems to reduce coke rate, optimizing slag chemistry setpoints, and increasing BOF gas capture. However, in the long run, several low-emission technologies, such as Hydrogen-based DRI, CCUS, and near-zero emissions EAFs, are being explored globally—but their readiness and cost structures remain uncertain in the Indian context.

2.3.2. Emerging policy to support decarbonization

India has begun laying the policy foundation for decarbonizing its steel sector, focusing on demand creation, efficiency incentives, and early technology pilots.

To stimulate demand, low-carbon steel is being integrated into public infrastructure via procurement mandates under PM Gati Shakti and the NIP.[33] Efficiency improvements are supported through performance-linked schemes like Perform Achieve Trade (PAT).[34] Complementing PAT, the Carbon Credit Trading Scheme (CCTS), set to be operationalized in FY26, will establish a unified national market for trading emission reductions, allowing efficient producers to monetize surplus credits while enabling cost-effective compliance for others.[35] On the supply side, a key policy is the NGHM, which aims to position India as a leading hub for green hydrogen production and use, with the steel sector identified as a key application area. The Indian government has facilitated initial pilots for hydrogen-based DRI through land and incentive support to private companies. Broader access to capital remains a constraint, and emerging policies like coal gasification with carbon capture may offer alternative low-carbon reductants.[36]

On standards, a low-carbon steel taxonomy developed with BIS establishes clear emission thresholds and classification norms. From fiscal year 2027-28, centrally funded projects are expected to require the use of green-rated steel. The revised PLI 1.1 scheme for specialty steel may further encourage the adoption of low-emission processes.[37]

Circularity is also being targeted. The upcoming End-of-Life Vehicles (EoLV) Rules (2025) mandate the use of recycled steel in vehicles with 8 percent of legacy steel and expected to increase to 18 percent by fiscal year 2036.[38] Recent amendments to Hazardous Waste Rules broaden Extended Producer Responsibility (EPR) to non-ferrous metals and promote digital traceability. These aim to boost scrap usage and reduce dependence on primary inputs.

While these policies signal the intent for long-term progress, scaling low-carbon steel would require deeper capital support, stricter emission targets, and a more well-defined transition roadmap.

2.3.3. Strategic choices and transition risks

Even as policy architects lay the foundation for India's low-carbon steel transition, the industrial realities on the ground remain significant. The challenge of balancing legacy assets with emerging technologies places the spotlight on the sector's next chapter amid global climate ambitions.

India's steel industry is experiencing significant expansion. Expanding EAF capacity provides a lower emission alternative for steel production. However, the effectiveness of this approach depends on several key factors: the availability of high-quality, affordable scrap (as discussed in Section 2.6), access to DRI inputs, and a supply of clean, cost-competitive, and reliable electricity. These conditions are essential for EAF technology to serve as a practical and sustainable solution in the transition to low-carbon steelmaking.

India's steelmakers face a strategic choice: either continue investing in conventional BF-BOF capacity to satisfy increasing demand or actively pivot toward cleaner technologies, that can utilize abundant iron ore grade available in the country as well as identify carbon storage potential. While embedding flexibility into new BF-BOF assets may enable future retrofits or fuel-switching, international experience indicates that such measures alone are rarely sufficient without parallel investments in enabling infrastructure, low-emission feedstock, and supportive market signals. Given the scale and timing of upcoming capacity additions, decisions made today may influence the feasibility and pace of future decarbonization choices.

[33] Steel Radar.
[34] Perform, Achieve and Trade (PAT), Bureau of Energy Efficiency (BEE), Government of India, 2025.
[35] "Carbon Pricing in India: Market Mechanisms for Climate Leadership", Government of India, Ministry of Power, Press Information Bureau, June 23, 2025.
[36] Steel decarbonization in India report, Government of India, Ministry of Steel, Press note, 2024.
[37] Production Linked Incentive (PLI) Scheme 1.1 for Specialty Steel launched, Government of India, Ministry of Steel, Press Information Bureau (and related media coverage), January 2025.
[38] 'Big changes ahead for Indian carmakers on recycling steel,' The Economic Times, January 14, 2025.

2.4. Navigating the iron ore supply challenges

In contrast to India's steel ambitions, the country's iron ore equation is shifting from surplus to uncertainty. The expanding horizon of steelmaking, coupled with persistent delays in mine activation and declining ore quality, makes secure and scalable raw material sourcing increasingly essential. In this environment, government reforms and infrastructure investments could ideally aim to deliver systemic solutions.

Although iron ore production increased from about 145 million metric tons in 2015 to around 280 million metric tons in 2024, the growing steel capacity and associated demand may lead to an increased reliance on imports by 2035 (Exhibit 14).

Delays in operationalizing auctioned mines heighten the risk of a shortfall. Over 440 mines have been auctioned since 2015, but only 56 are operational.[39] These delays are caused by issues in permitting, land acquisition, and logistics. Additionally, bid premiums exceeding 100 percent of reserve values make commercial viability more challenging.

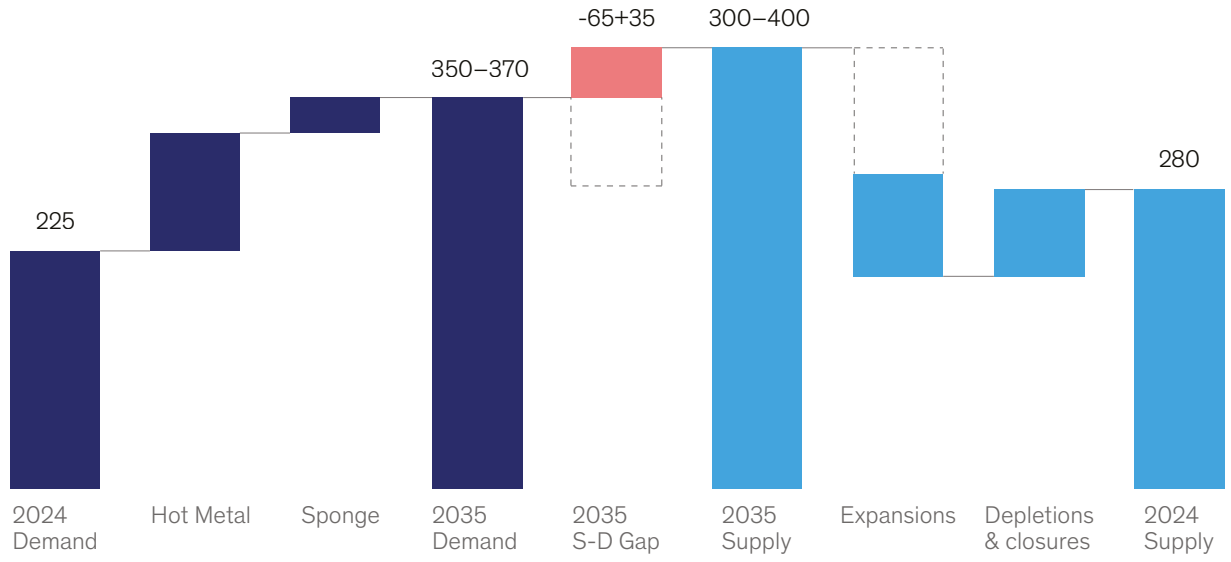
In response, the government has taken progressive steps, including amendments to the Mines and Minerals Development and Regulation Act (2021), auctions of expired leases, liberalization of captive mine sales, and promotion of beneficiation and pelletization.[40] However, challenges persist; up to 80 million metric tons of existing capacity could retire by 2035 due to depletion and closures, while the expiration of captive leases in 2030 may disrupt the market unless re-auctioning is smoothly managed.[41]

Ensuring iron ore availability at scale and competitive cost would require faster mine development, investments in improving ore quality, and supportive logistics infrastructure, especially for steelmakers operating coastal plants or relying on sponge iron routes.

Exhibit 14

The imports of iron ore in India are expected to rise.

Iron ore supply and demand, 2024–2035, million metric tons



Source: McKinsey materials team, expert discussions, IBM, SteelMint

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[39] Economic Times, 'Quarterly review in the works for auctioned mines to begin operations fast' The Economic Times, January 28, 2025
[40] Ministry of Mines proposes policy for promotion of beneficiation of low grade ore, Government of India, Press Information Bureau, April 12, 2025.
[41] McKinsey Materials Team, IBM, SteelMint, Expert discussions.

2.5. The Landscape for met coal

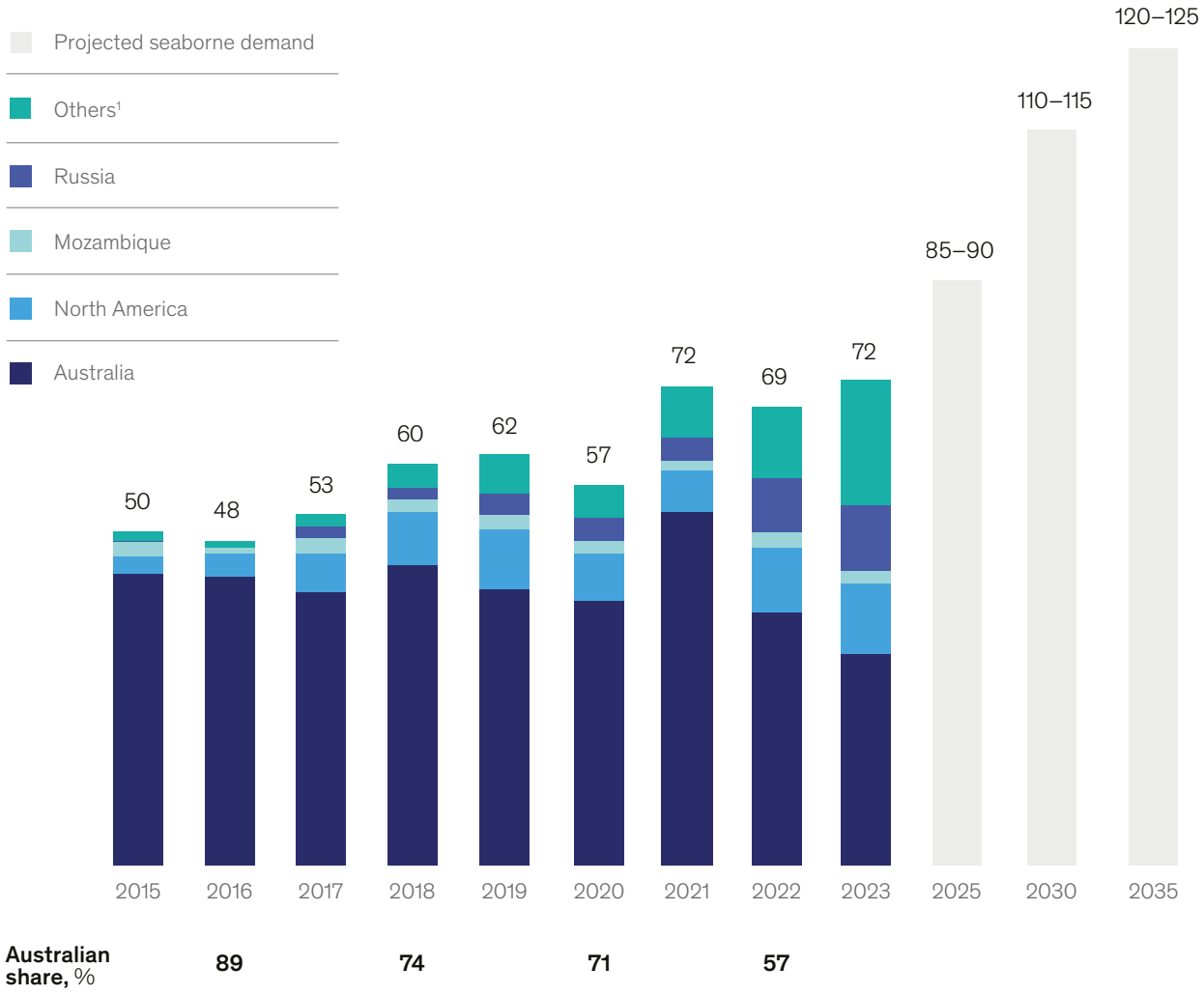
As countries move toward non-coal-based steelmaking and scrap supply grows, global met coal demand is expected to drop by 1 to 2 percent.[42] This is primarily due to projections of falling annual demand for met coal in China, Europe, and the Commonwealth of Independent States (CIS) countries between 2023 and 2035. However, demand for seaborne met coal could grow with the addition of new BF-BOF-based steel capacities in emerging markets such as India and SEA. India could lead the demand for seaborne met coal, growing from 72 million metric tons in 2023 to between 120 million and 130 million metric tons in 2035 (Exhibit 15).

Australia continues to be India's dominant supplier, accounting for nearly half of total imports. However, in recent years, its share has seen a gradual decline as steelmakers diversify their sourcing to manage price volatility. Imports from regions like Mozambique, North America, and Russia increased, supported by long-term contracts and upstream investments in mining assets.[43]

Exhibit 15

India's metallurgical coal imports are increasing with a more diversified supply base.

Indian metallurgical coal imports by source, million metric tons



[1]Others includes Canada, China, Indonesia, New Zealand, South Africa, etc.
Source: Indian Ministry of Commerce and Industry, MineSpans

McKinsey & Company

[42] MineSpans by McKinsey, McKinsey analysis.
[43] India's iron ore imports are projected to increase to 8-10 million metric tons in 2025, largely driven by JSW Steel, Reuters, July 2025.

2.6. Navigating the scrap supply challenge in India

Steel scrap is emerging as a critical, yet limited, resource for India's steelmakers as they pivot toward lower-carbon production routes. Demand for scrap may rise over the next decade, driven by limited iron ore availability and rising decarbonization pressures. However, structural limitations in domestic scrap generation mean that India may face a persistent supply gap, increasing reliance on imports, and intensifying competition for this circular raw material. The challenge is compounded by the scarcity of scrap globally, along with rising electricity prices. Rising EAF adoption in major steel-producing regions, particularly in China, Europe, and SEA, could tighten international markets, drive up prices, and intensify competition for volumes. For India, this means that dependence on imports could become both more expensive and less reliable, especially if exporting nations impose restrictions to protect their own decarbonization goals.

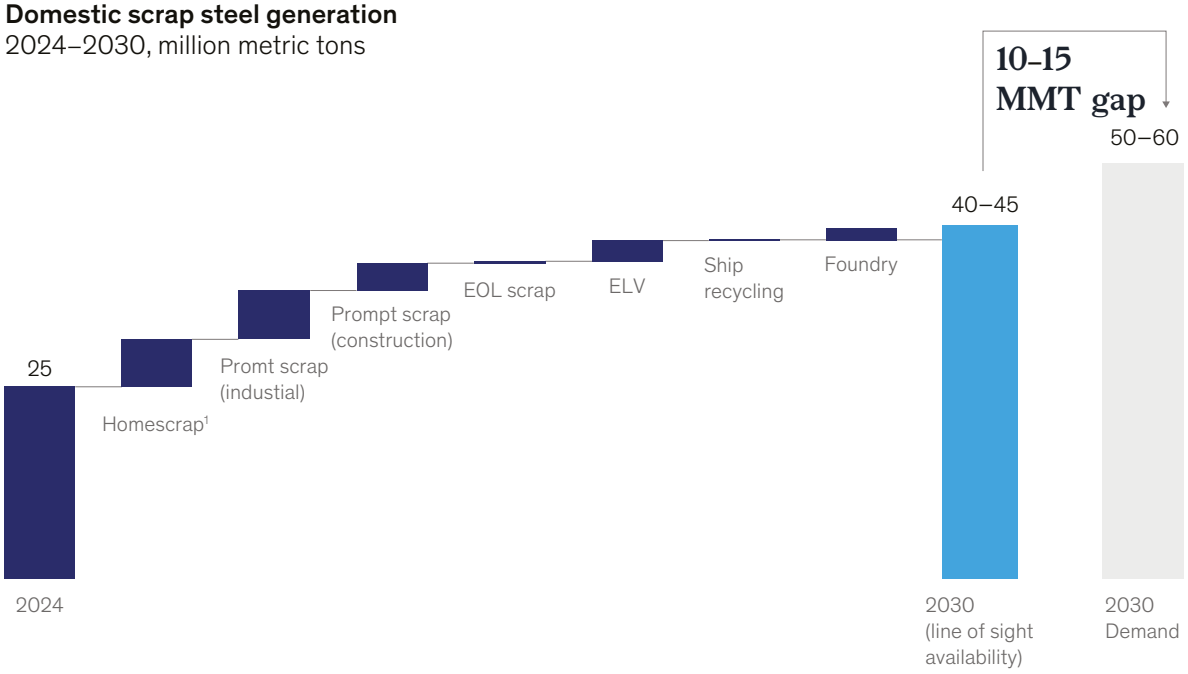
Scrap plays a dual role in India's steel industry as a feedstock for EAF/IF operations and as a decarbonization lever across all production routes. In fiscal year 2024,, India consumed approximately 33 million metric tons of scrap, with about 30 percent met through imports.[44] By 2030, the total demand for scrap is expected to reach about 50 million to 60 million metric tons. However, domestic supply is unlikely to keep pace, resulting in a 10 million to 15 million metric ton decline (Exhibit 16).

The rise in scrap demand is driven by several factors. A growing share of steel production could shift to the EAF and IF routes, which are more capital-light and versatile than the traditional BF-BOF route. Scrap use also offers one of the quickest ways to lower carbon emissions, making it increasingly important as demand for low-carbon steel rises in both domestic and export markets. Beyond its role in decarbonization, scrap is valued for its material efficiency, delivering significant savings in raw material and energy consumption.

While scrap use offers these advantages, structural constraints limit domestic scrap supply. India's relatively recent industrialization and historically low steel usage mean that fewer end-of-life assets are available to feed the scrap pool. Collection and processing remain fragmented, with the sector dominated by small-scale operators whose output quality and recovery rates vary widely. Scrap generation is concentrated in a handful of sources, like construction and demolition waste, end-of-life vehicles, and ship-breaking, many of which remain underutilized. Beyond volume, quality

Exhibit 16

Domestic scrap steel generation is expected to decline by 10-15 million metric tons by 2030.



[1]Home scrap and prompt scrap output is a function of the total steel generated.
Source: Ministry of Steel report; BigMint report

McKinsey & Company

[44] BigMint.

remains a critical challenge, with a significant share of domestically collected scrap containing impurities such as non-ferrous metals, coatings, and contaminants that reduce its suitability for high-grade steelmaking without additional processing.

There is meaningful potential to increase scrap recovery from these sectors. End-of-life vehicles could contribute between 4 and 6 million tons annually by 2030 as the vehicle parc ages and scrappage activity grows.[45] Ship-breaking could add a further 3 to 4 million metric tons a year, with activity focused in specific coastal clusters.[46] Urban redevelopment and infrastructure replacement could also yield significant volumes from construction and demolition waste, though capturing this potential requires scale, efficient reverse logistics, and modern recovery technologies.

A large number of micro, small, and medium enterprises operate in the EAF and IF segment, forming the backbone of India's scrap processing ecosystem. These enterprises are critical in aggregating, sorting, and supplying scrap, but they face ongoing challenges in procurement efficiency, feedstock quality, and access to capital for upgrading processing capabilities. The performance of this segment is likely to directly influence the availability and quality of scrap in the domestic market.

Trade dynamics will also influence India's scrap market. In a tightening global market, scrap-exporting countries may prioritize domestic needs or impose quality and certification standards that limit flows. This makes India's scrap supply position not only a domestic collection challenge but also a matter of international trade competitiveness and resilience.

India's scrap steel picture is one of strategic importance and persistent scarcity. As steelmakers expand low-carbon capacity, securing high-quality scrap will become a factor in ensuring a competitive advantage. In a global environment where availability is tightening and trade relationships increasingly matter, the ability to tap into domestic sources, ranging from industrial returns to end-of-life vehicles and ship-breaking, is likely to become essential to maintaining cost competitiveness, achieving carbon targets, and building resilience in the years ahead.

[45] Parc refers to the total number of registered vehicles that are actively in use within a specific country, region, or globally at a given point in time.
[46] Based on data from the Ministry of Steel, BigMint, expert discussions and team analysis.

03

Strategic imperatives for the Indian steel industry

As India continues on its path of rapid industrialization and infrastructure development, the steel sector is poised for significant growth but faces complex challenges. At this critical juncture, stakeholders must navigate a landscape marked by volatile global trade dynamics, dependence on imported raw materials, and increasing pressure to adopt low-carbon technologies. The priority of policymakers could turn to ensuring that growth does not outpace resilience. Securing high-grade iron ore and reliable clean energy will be among the factors vital for competitiveness, while targeted incentives and financing could accelerate the adoption of low-carbon technologies. Achieving sustainable growth and global competitiveness could hinge on prioritizing key strategic shifts.

3.1. The road ahead for steel manufacturers

With India on track to maintain its position as one of the fastest-growing consumers of steel, domestic producers face a dual challenge: scaling capacity to meet future demand while transforming operations to stay competitive in a low-carbon world.

Three key strategic questions emerge as critical and definitive influences on the strategy that Indian steelmakers might adopt, focusing on the most important sectors and export markets impacting demand, the route to accelerate decarbonization while managing costs and raw materials, and the journey toward a resilient, cost-efficient supply chain.

Which end-use sectors are likely to drive the next phase of domestic steel production?
As steelmakers explore the demand scenario, they could take the following steps:

— Prioritize sectors with high steel demand and growth potential, such as infrastructure, green energy (solar, wind), defense, and electric mobility.

— Invest in specialized steel value chains (such as advanced coatings and electrical steels) to align with future demand patterns.

— Diversify export footprint to focus on growing markets.

How can steelmakers accelerate decarbonization while managing cost and access to critical inputs?
The journey to decarbonizing faster could rest on the following approach:

— Develop a roadmap for integrating low-carbon technologies (like NG/H2-DRI) while enhancing energy efficiency in existing BF-BOF setups.

— Secure long-term access to scrap, green power, and low-emission raw materials.

— Tap into public funding sources like the PLI schemes, concessional finance, and climate-linked instruments to offset decarbonization capex.

How can steelmakers build a resilient and cost-efficient supply chain for raw materials and energy?
Steelmakers could reimagine their supply chain with a focus on the following objectives:

— Reduce reliance on imported coking and met coal by focusing on domestic exploration, beneficiation, blending, and alternate sourcing strategies, along with shifting some of the capacity to EAF.

— Optimize inbound material costs and access to low-cost power by locating future capacity near zones rich in renewables and coal.

— Deploying AI-powered quality control and predictive maintenance to minimize downtime, improve yields, and reduce energy intensity.

3.2. The supporting role for the government

As India scales up its steel sector to meet rising domestic demand and strengthen its export position, the government could play a supporting but invaluable role by helping to unlock sustainable growth and global competitiveness through four priorities:

1. **Improve cost competitiveness through infrastructure and market efficiency.**

— Reducing structural cost disadvantages in logistics, such as higher freight costs compared to global peers and lowering energy costs, could strengthen India's steel value chain.

— Continued investments in multimodal transport infrastructure, efficient freight corridors, and access to affordable renewable power may support more competitive steelmaking.

2. **Strengthen raw material resilience across the value chain.**

— Scaling up beneficiation and blending infrastructure, along with standardizing auction processes across states, could unlock additional value from domestic iron ore reserves.

— Modernizing washeries and improving cross-ministerial coordination for coal may augment the availability of low-ash coking coal for steelmaking.

3. **Facilitate responsible resource development.**

— Unlocking high-potential mineral reserves may require addressing implementation challenges such as land acquisition, approvals, and commercial viability.

— Investing in local infrastructure and stakeholder engagement mechanisms may support more sustainable and inclusive resource development.

4. **Raise quality standards and align with global benchmarks.**

— Strengthening national quality assurance frameworks, such as third-party certification and plant-level audits, could improve consistency and reliability across the steel value chain.

— Closer alignment of domestic standards with global benchmarks may strengthen India's competitiveness in export markets and high-end applications.

5. **Drive decarbonization through coordinated policy and market mechanisms.**

— Strengthening inter-ministerial coordination across steel, energy, and environment to accelerate adoption of green hydrogen, renewable energy, and CCUS.

— Expanding the CCTS into a robust carbon market and introducing low-carbon steel procurement policies to create strong domestic demand signals, incentivize private investment, and enhance India's export competitiveness.

India's steel industry is an integral enabler of the country's industrial prowess, showing remarkable resilience and growth in recent years. It plays a key role in developing infrastructure and unlocking India's aspirations for economic growth. The industry could benefit from strategic actions that draw on global best practices, build on strengths, and bolster important areas for improvement through a collaborative effort by all stakeholders.

These initiatives could propel India to emerge as a global manufacturing hub and economic powerhouse, even in an environment that constantly evolves in response to geopolitical uncertainties and sustainability imperatives.

McKinsey & Company
September 2025

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