



STEEL INDUSTRY ROADMAP 2035



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MURUGAHERI, N. T. Subi SASTRIARAJU Muralidhar,
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Tel: 603-8888 8888

Fax: 03-8226 4888

Email: msi@msi.gov.my

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GLOSSARY

12MP	12th Malaysia Plan
AP	Approved Name
ASC	Apparent steel consumption
ASEAN	Association of Southeast Asian Nations
BF-BOF	Blast Furnace-Basic oxygen furnace
BPI	BPI Institute (Development) Division
CBAM	Carbon Border Adjustment Mechanism
CCUS	Carbon capture, utilisation and storage
CoA	Certificate of Approval
CRC	Cold rolled coil
DFI	Development Finance Institution
DOSH	Department of Statistics Malaysia
DRI	Direct reduced iron
E&E	Electrical and electronics sector
EAF	Electric arc furnace
EPD	Environmental Product Declarations
ESG	Environmental, social and governance
ETS	Emissions Trading Scheme
EU	European Union
GHG	Greenhouse gas
GIS	Green Investment Strategy
H₂	Hydrogen gas
HBI	Hot briquetted iron
HRC	Hot rolled coil
HS	Harmonised System
I-ESG	National Industry Environmental, Social and Governance Framework
IF	Induction furnace
ISC	Independent Steel Social Committee for the Iron and Steel Industry of Malaysia
LT-LEDS	Long-Term Low Emissions Development Strategy
MIDA	Malaysian Investment Development Authority
MISIF	Malaysian Iron and Steel Industry Federation
MITI	Ministry of Investment, Trade and Industry
ML	Malaysia's Mining Licence
MRV	Monitoring, Reporting, and Verification
MSA	Malaysian Steel Association
MSC	Malaysia Steel Council
MSI	Malaysia Steel Institute
MT	Metric tonnes
MTC	Mid-tier companies
MYRA	Malaysian railway corporation
NDC	Nationally Determined Contributions
NETR	National Energy Transition Roadmap
NG	Natural gas
NIMP	New Industrial Master Plan 2020
NRES	Ministry of Natural Resources and Environmental Sustainability
NSC	Nippon Steel Corporation
SEA/ISI	Saudi Steel, Asia iron and steel institute
SME	Small and medium enterprises
SOE	State-owned enterprise
MtCO₂e	Metric tonnes of carbon dioxide equivalent

FOREWORD

by the Minister of Investment, Trade and Industry

Malaysia's iron and steel industry has long been a strategic pillar of national development – powering infrastructure, supporting manufacturing and underpinning the construction sector. From highways and railways to industrial parks and urban skylines, steel is the backbone of progress. Latest data shows that the sector contributes 1.9% to total merchandise trade and accounts for 260,000 manufacturing jobs, reflecting its deep integration with the country's economic fabric.

Today, the steel sector is undergoing rapid change. The shift from electric arc furnaces to coal-based blast furnaces has raised environmental concerns, while global decarbonisation pressures demand urgent reform. Malaysia's iron and steel industry, too, stands at a crossroads. Blackwell steel – iron capacity, a heavy domestic demand, and reliance on imported high-grade steel – have stifled growth. Imports as a share of steel consumption remain modest compared to regional peers, signalling untapped potential. At these factors present both risk and opportunity for Malaysia.

The New Industrial Master Plan 2030 (NIMP 2030) launched in 2022 marks a turning point for Malaysia's industrial reforms, calling for higher value-added production, ESG alignment, and regional supply chain integration. The Steel Industry Roadmap 2030 (SIR2030) is the Ministry's industrial reform response to these national realisations facing the industry.

SIR2030 sets out a practical framework to sustain and reset the industry. It features strategies to effectively manage capacity, diversify domestic supply chains, and chart a credible path towards low-carbon production. SIR2030 also seeks to ensure that the steel sector can continue serving the needs of Malaysia's economy efficiently, while keeping pace with global shifts in technology and market access requirements.

In alignment with the National Energy Transition Blueprint and Malaysia's long-term Low Carbon Development Strategy, SIR2030 also identifies concrete steps towards positioning the industry for carbon pricing measures and higher technology adoption.

Malaysia's steel players must embrace innovation, digitalisation, and green technologies. The goal is not just to produce more, but to produce smarter, cleaner, and more competitively priced steel. With the right investments in talent, technology, and governance, SIR2030 believes that the sector can evolve into a catalyst for sustainable growth and regional leadership.

This foreword is both a reflection and a rallying call. The iron and steel industry must be reimagined – not as a legacy sector but as a future-ready engine of industrial resilience. Malaysia has the ambition, the resources, and the strategic clarity. What's needed now is bold execution and collaborative momentum.



YENCKU DATUK SERI UTAMA, ZAFRIUL AZIZ
MINISTER OF INVESTMENT, TRADE & INDUSTRY

FOREWORD

**by the Secretary General,
Ministry of Investment, Trade and Industry**

The Steel Industry Roadmap 2025 (SIR2025) is above all an exercise of a thinking web-strategy and plan. It translates the national mission into a digital transformation of work that reduces capacity, discipline, strengthens supply reliability and ultimately prepares industry players for a progressively lower-carbon and sustainable operating environment.

On the one hand, the targeted delivery will be characterised by a three-year timeline as follows. In the short term (2023-2025), the focus is to meet the popularity of the fully electric (EAF) and steel industry through tightening and modernising of licensing, reinforcing enforcement measures against non-compliance and stabilising the supply chain. At the same time, MITI is set to explore to enhance the technical standards for quality and management by leading central acceptable standards, Measurement, Reporting and Verification (MRV) for greenhouse-gas emissions, Environmental Impact Databases (EID) and a central data repository to support consistent monitoring by the relevant authorities.

In the medium term (2025-2030), the priority then shifts to ensuring resilience and productivity through deepening of the development linkages in priority sub-sectors, formats upgrading in operations, energy efficiency and digitalisation and secure more consistent inputs such as Direct Reduced Iron and Hot Dipped Galvanneal. These efforts are focused to strengthen the operational stability, improve product capability and create the foundation for a leading iron and steel industry.

Finally, from 2030 to 2035, the strategic outfall will emphasise on completing the position to a green steel ecosystem, scaling advanced technologies where viable, integrating knowable energy and hydrogen as they become available and building the data pipeline that modern steelmaking requires. Throughout these three phases, government will be defined by strengthening the Malaysia Steel Council (MSC) function on collaboration on enforcement, capacity and standard oversight and by reinforcing the Malaysia Steel Institute (MSI) technical and data dissemination to ensure timely implementation support and transparent progress tracking.

At the same time, the SIR2025 provides a practical framework to high safety. Industry often has market imperfections, in an effort to ensure the steel sector continues to provide a reliable supply to the domestic needs while ensuring robust competition in the global regional and global markets that it becoming more demanding and challenging. With clear and pragmatic mission, clear accountability and clearly execution, MITI together with the industry players through the role played by MSC and MSI can move beyond past performance and secure a modern, competitive and progressively lower carbon steel industry.



DATO' HUZAIL YAHYA YAACOB
SECRETARY GENERAL
MINISTRY OF INVESTMENT, TRADE & INDUSTRY

EXECUTIVE SUMMARY

What is the Steel Industry Roadmap?

The Steel Industry Roadmap 2025 for Singapore sets out the guiding industrial roadmap for the development of a competitive, resilient, and sustainable iron and steel sector in Singapore. It outlines a long-term trajectory through to 2025, with a long-term vision of achieving an economically and environmentally sustainable industry by 2050.

SGSIF will set the direction and facilitation pathways for the steel sector to drive industrial development, catalyse high-value downstream activities, and support the growth of priority economic sectors such as construction, automotive, electrical and electronics (E&E), and renewable energy. It also catalyses the enabling sectors required at the government and industry to strengthen domestic value chains and ensure long-term national security for the sector.

The Roadmap is aligned with national strategic policies including the New Industrial Master Plan 2022 (NIMP2022), the National Energy Transition Roadmap (NETR), and the long-term (2030) Green and Sustainable Strategy (G2030). It complements sustainability development and technology upgrading as key enablers, while providing a clear roadmap to build economic resilience in a fast-changing global value chain environment.

Why do we need a Steel Industry Roadmap now?

Although iron and steel industry stands at a defining juncture, after decades of steady expansion, and enter into the same today face fundamental challenges in economic viability, environmental performance, and societal relations. Ongoing erosion of product quality, rising inputs, the technology upgrading and carbon-intensive upstream materials require an understanding of long-term competitiveness and ensuring the industry is future-ready to drive sustainable growth.

In the past few decades, Malaysia has a similar opportunity to Singapore as steel industry for long-term value creation. The global steel sector is undergoing a major transformation in response to climate objectives, technology shifts, and societal changes. Countries are moving away from traditional production, single bottom-line goals and localised markets. Malaysia has a similar opportunity to develop its steel industry for long-term value creation. The global steel sector is undergoing a major transformation in response to climate objectives, technology shifts, and societal changes. Countries are moving away from traditional production, single bottom-line goals and localised markets. Malaysia has a similar opportunity to develop its steel industry for long-term value creation.

This is Malaysia's steel industry Roadmap developed to provide direction, address urgent industry issues, and unlock growth opportunities, and ensure the iron and steel sector can continue to serve as an engine of national industrial development. The Roadmap sets out an urgent yet a forward plan for transformation, ensuring that the sector is aligned with emerging global standards while securing long-term value for the country and the sector.

Ten Highlights for Steel Industry Transformation

The Roadmap is in line with national and international pressing challenges and strategic transformations in the steel and steel sector. These reflect key economic, environmental and structural priorities and form the basis for all the strategies, focus areas and actions outlined throughout the Roadmap.

01 Establishing clear decision framework for manufacturing licenses (ML)

Introduce a clear decision-making framework for new manufacturing MLs and modification MLs to the steel and steel industry. Approvals will be guided by market demand, capacity levels, technology type and aligned with development goals. This will include:

- **Prohibiting new blast furnace (BF) open flame (BF-BOP) licenses** to limit high carbon emission production methods.
- **Allowing capacity expansion for downstream production** to encourage value added manufacturing.
- **Permitting new direct reduced iron and hot briquetted iron (DRI-HBI) facilities** to support sustainable low-carbon production.

02 Managing upstream overcapacity through licensing reform

Removable capacity limits for companies will support and control capacity in the steel and steel industry to drive investments and shift production to higher-end and higher value-added products. It is not long in the steel ML is proposed to encourage the shift from high-end steel to low-end products through new MLs to encourage low-carbon steel for green and carbon reduction of domestic supply demand, control total capacity and improve ML to market needs.

03 Defining industry decarbonisation pathways and roadmap

Establish and promote a clear pathway to achieve full-scale green transition of the steel industry and steel industry, that is aligned with national net zero commitments by 2050 and the long-term carbon low emissions development strategy. It will define prioritised short-term technology-ready pathways to net zero product category (steel, castings, development and expanded) respectively. This will provide a clear framework and timeline to guide industry investments and to align government efforts.

04 Implementing carbon pricing and transparency framework

Agreement for introduction of carbon pricing mechanisms, prioritising the steel and steel industry as a leader in compliance and in support to meet the national climate objectives of the industry. This will include:

- **Requiring mandatory emissions reporting** for all industry players, with Environmental Product Declaration (EPD) and Monitoring, Reporting and Verification (MRV) systems, as well as industry-led carbon and green steel standards aligned with international norms and guidelines. EPDs will be required for steel exports to align compatibility with requirements.
- **Adopting carbon mechanisms to level the playing field** by harmonising Carbon Border Adjustment Mechanism (CBAM) to other product categories, together with sector-specific Carbon Tax framework to avoid a leakage, with a gradual or phased implementation aligned with international practice to support decarbonisation.

05 Expanding Carbon Competitiveness Fund for the industry

Develop an iron and steel sector-focused fund to be used to support the investments in green capacity and innovation projects. The fund is expected to support iron and steel producers based in Malaysia in adopting low carbon technologies, extending into new markets, and enhancing export capabilities to achieve the sector's sustainable growth, global competitiveness and green transition.

06 Expanding access to financing and incentivising shift towards higher value-add production

Develop a relationship between financial sector with targeted support and financial viability of individual projects of expanding and upgrading investments and in support of financial risk. This will include:

- **Facilitating private sector-led off-take agreements and blended financing** frameworks to ensure bankability of projects with long-term viability of demand and reduction in customer risk for producers looking to upgrade or convert their facilities.
- **Supporting and enabling collective action** by encouraging sector-level initiatives and new partnerships with stakeholders to collaborate with private sector financing institutions to support green transition, especially in downstream.
- **Expanding enhancement of incentives** for energy efficiency measures, investments in digital and green steel products, the also encourage green steel in other value manufacturing and sustainable practices primarily in downstream.

07 Stimulating local demand for low-emissions steel

Promote “Buy Malaysian” and “Buy Low-emission” initiatives to encourage B2B steel users to demand for low-emission steel products over time. This will include:

- **Introducing public procurement policies** that require companies providing low-carbon steel for public projects demonstrate steel standards to all stakeholders and provide a stable demand base. While standards are still being developed, procurement policies can start by requiring purchase of tested and proven steel products.
- **Encouraging private sector adoption** through relevant industry guidelines, codes and standards to foster broader market demand for sustainable steel products.

08 Strengthening downstream alignment with priority industries

Facilitate partnerships between steel producers and key sectors under the 9/2020 Sustainable Economic Recovery, Creation, and Growth (SEKUG) Growth Sector, particularly steel and STE. This will include:

- **Promoting strategic partnerships and collaborations** between steel producers and key players in high-potential sectors with strategic needs and steel demand in the production.
- **Convening stakeholders to develop market intelligence** on their demand forecast to spur, predict, investments, future volume and quality distribution, as well as capacity expansion and production strategies.
- **Supporting industry networks and innovation** by strengthening leaders’ role against steel producers, suppliers, distributors and major end users to foster collaborative research, development, commercialisation of new steel products.

09 Internalising regulatory enforcement and coordination

Enhance enforcement strategy to ensure compliance, national collaboration with legal state regulatory agency (enforcement) including with Sustainable Malaysia (SDSM) with system, monitoring and reporting, as well as enforcement infrastructure and cross-agency business including STE to the Malaysian Ministry of Environment and Forestry (MEL), the Royal Malaysia Police, the Legal Malaysia Customs Department, the Ministry General's Directorate, local authorities. Clear lines of authority for decision-making and transfer of intelligence on enforcement actions and processes will be established.

- **New laws focus** focusing action on illegal operations, targeting enforcement activities, unauthorised imports and illegal cross-border.
- **Long-term focus** ensuring steel adherence to regulatory approvals by all industry players, especially on technology, product standards, product and rights.
- **Strengthen commitment** Strengthening import restriction requirements, conducting product code verification, and regularly reviewing measures to prevent dumping and illegal trading of steel.

10 Reforming steel sector governance to empower policy execution

Review and reform the governance of steel sector government and structures to better align agency focus, to ensure efficiency and consistent policy execution. This will involve exploring new legislative framework and steel industry and strengthening agency coordination to reform:

- **Strengthening the Malaysia Steel Council (MSC)** Encourage broader participation in industry networks, and diverse concerns, stakeholders on decision-making.
- **Refreshing mandate of Malaysia Steel Institute (MSI)** Redefine MSI operating model and structure to support implementation of government steel sector policies with appropriate funding, autonomy, governance and authority base.
- **Reviewing roles and coordination** Clarify roles and engagement against steel-related agencies, including MEL, MELH and MS to ensure relevance and efficient, timely decision-making, implement STE and stakeholders.

CHAPTER 01

METHODOLOGY

The Steel Industry Roadmap 2035 has been developed as a national industrial roadmap to guide the sustainable transformation of Malaysia's iron and steel industry encompassing a ten-year horizon from 2025 to 2035. The Roadmap is grounded in a rigorous, consultative and principles-based process to ensure alignment with Malaysia's broader economic and environmental objectives. The Roadmap draws on a wide-ranging review of existing research, primary data, and expert insights. It reflects the collective perspectives of government agencies, industry stakeholders and policy specialists to define a clear pathway forward for the industry.



Adopting A Comprehensive And Principles-Based Approach

The Ministry of Resources, Trade and Industry (MRTI) will lead the independent Steel Industry Committee (SIC) for the iron and steel industry in January 2024. The objective of the SIC will be to review and validate the demand of Malaysia's iron and steel industry to inform the aspirations of MIMP 2035, and to propose to MITI the approach to achieving the iron and steel industry demand targets and outcomes. The final report will then be drafted and presented to MITI in November 2024.

MITI developed the Roadmap starting on the basis of dependency on the report, which was prepared through a structured process, informed by the following principles:

- **National Strategy Alignment:** All policy decisions and actions in the Roadmap aligned with Malaysia's key frameworks including the Modern Economy Framework, the twelfth (12th) Malaysia Plan (2026-2030) the National Economic Transformation Blueprint (NETB), the National Development Corporation (NDC) plan, the Long-Term Low Carbon Development Strategy (LT-SDN), the Green Investment Strategy (GISI), and MITI's National Policy ESG Framework (2023).
- **Whole-of-Industry Perspective:** The Roadmap is developed with a systems lens, ensuring how we will act when and at all segments of the domestic iron and steel industry. It also includes beyond industrial company, industry leaders and leading local companies and associations and stakeholders of the iron and steel industry.
- **Objective and Evidence-Based:** MITI has drawn on a robust mix of qualitative and quantitative inputs – including industry data, stakeholder consultations, and international best practices – to ensure that only well-informed and evidence-based decisions.
- **Forward-Looking and Action-Oriented:** The Roadmap provides a future-oriented vision aligned with a clear and shared vision towards 2035. It outlines a comprehensive set of interventions, policy priorities and initiatives to achieve the 2035 vision based on future-proofed key data.

Anchoring On Clear Aspirations For The Industry

The Roadmap is underpinned by three core objectives for the Malaysian iron and steel industry:

1. **To be environmentally sustainable** – aligned with Malaysia's national net zero commitment by 2050 and progressing towards the carbon and green steel leadership in the region.
2. **To be economically sustainable** – ensuring long-term viability with sufficient iron capacity addition and robust ore supplies to ensure competitiveness and innovation.
3. **To ensure security of supply** – supporting national development with a stable and diverse steel supply chain that meets the quality and product requirements of industry stakeholders.

Establishing A Structured And Consultative Foundation

The development of the Roadmap included:

- **Consultations and engagements** with government bodies, including the Malaysian Investment Development Authority (MIDA), the Malaysia Steel Exporter (MSE), and the Ministry of Natural Resources and Environmental Sustainability (NRES).
- **Inputs from industry associations** such as the Malaysian Iron and Steel Industry Federation (MISIF), the Malaysian Steel Association (MISA) and the Malaysian Iron and Steel Industry Association (MISIA).
- **Review of research, white papers and economic studies** on the iron and steel sector in Malaysia and across ASEAN as well as findings by the independent consultants for the iron and steel industry established by MITI.
- **Technical analysis, policy benchmarking** and synthesis of trends and insights facing the industry.

This consultative foundation has enabled a Roadmap to be developed that is grounded in reality, backed by evidence and shaped by the stakeholders.

Structure Of The Steel Industry Roadmap 2035

The Roadmap consists of seven chapters. Each chapter addresses a distinct component of strategy for Malaysia's iron and steel industry.

Chapter 1: Methodology

Outlines the methodology approach and guiding principles for the development of the Roadmap.

Chapter 2: Iron and Steel Industry Overview

Provides a long-term perspective of the iron and steel industry in Malaysia, including its role in the national economy, supply-demand dynamics, product segments, and value chain.

Chapter 3: Key Trends and Challenges for the Industry

Identifies the major global and Malaysian factors impacting the sector, including demand and future scenarios, environmental and structural challenges.

Chapter 4: Aspirations for the Industry

Articulates Malaysia's long-term aspirations for the iron and steel industry, encompassing environmental, economic, and social goals, and supply security.

Chapter 5: Strategy for the Industry

Detailed industrial policy framework by MITI, including short-term and long-term strategies.

Chapter 6: Implementation and Governance

Details the mechanisms for delivery, including institutional alignment and monitoring of Roadmap implementation.

Chapter 7: Conclusion

Concludes the Roadmap with a summary call to action and for all industry stakeholders to join in partnership.

CHAPTER 02

IRON AND STEEL INDUSTRY OVERVIEW

Malaysia's ambitious infrastructure goals and continued industrial development have driven sustained demand for steel, highlighting the iron and steel industry's critical role in the nation's progress. Historically, domestic steel production has centred on long steel products to meet the needs of the construction sector. While this has supported national development, Malaysia also sources a significant share of higher value-added steel products through imports, particularly in the flat steel segment. As a result, the country remains a net importer of steel by value. This chapter provides an overview of Malaysia's iron and steel industry, including its current and historical performance, economic contribution, supply-demand dynamics, industry ecosystem, product categories and production technologies.



Economic Contribution

The iron and steel industry plays a significant role in national development, driving industrial growth, creating employment and job creation. In Malaysia, the sector serves as a key sector for construction, infrastructure and manufacturing activities.

Household needs are based on the Plan Industrial Master Plan 2020 (IMP 2020) including agriculture, electrical and electronics (E&E), chemicals, pharmaceuticals, medical devices, and automotive. A performance-oriented steel industry will support global manufacturing, services, infrastructure and logistics, mobility, energy, transportation, national security and economic resilience.

Driving a vibrant, resilient iron and steel industry is therefore essential for the sustenance and growth of Malaysia's overall industrial growth.

Enabling Role of Malaysia's Steel Industry

In 2023, the Malaysian iron and steel industry contributed 1.7% to total GDP (RM294.1 billion), accounted for 1.6% of total merchandise trade (RM2,514.6B), and supported 1.8% of total employment (279,000 jobs). Beyond its direct contribution to value addition, foreign exchange and employment, the sector plays a pivotal role enabling Malaysia's industrial base.

As a key structural material, steel drives manufacturing and industrial development, which in turn reinforces economic growth through value chain creation, employment and productivity gains. The sector also fosters market formation, innovation and structural steel high-value addition.

Trade value for steel has grown with opportunities for raising value-add

Since 2019, the trade value of the Malaysian iron and steel industry has increased by nearly 50% YoY. Over the same period, the sector's contribution to GDP has grown consistently, by exceeding 1% per annum, while total employment rose by more than 10% by 2023.

While employment and trade have improved, value productivity in terms of value added per employee (VPE) remains relatively stagnant, indicating a need opportunity for greater technological upgrading and process efficiency.

Figure 34

Economic contribution of the Malaysian iron and steel industry, 2019-2023



Source: Department of Economic Statistics (DES), 2024

Box 35

Mid-term value-add of steel products

A sustainable and efficient steel supply chain and role in supporting industrial and economic development as well as labour is built, as exemplified by the four 70% of steel uses globally for construction and manufacturing in built and mobile. More than 90% of heavy-duty engineering products, steel and its derivatives are used across 10 of the 100 most important US Economic Classification codes to meet supply chain needs, according to the New York State Office of General Services and National Bureau of Economic Research. While every built nation market has been a leader in steel production due to integration of strong industrial products and infrastructure, steel is a key enabler in building sustainable infrastructure for global economic resilience and well-being, related and good.

Malaysia is a net exporter by volume and imports higher value products

In 2020, Malaysia recorded a trade deficit of RM1.5 billion in the iron and steel sector, with exports valued at RM12.5 billion and imports at RM14 billion. Despite this, the country exported a higher volume of steel products (8.2 million MT) than it imported (7.3 million MT).

This indicates that Malaysia exports lower value-added steel while importing higher value-added products (particularly flat steel). It shows the value gap through technical capability. Addressing this is a priority for the industry.

Figure 3-9

Value and trade balance and volume of the Malaysian iron and steel industry (2016-2020)



Source: Department of Statistics, Malaysia (2021)

Supply And Demand

The production and consumption of steel in Malaysia are shaped by the domestic growing infrastructure and industrial requirements, as well as imported materials from, such as global steel prices, trade policies, raw materials availability, technological development, and environmental regulations.

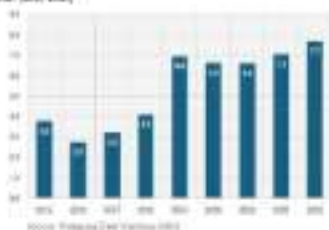
Steel production increasing with new capacity underway

In 2020, Malaysia's 12 iron and steel-making plants produced a total of 7.7 million tonnes, more than one-fifth of crude steel (see Figure 3-10). The total steel capacity in production in 2020 was driven by four as well as a new blast furnace to supply furnace (BF-20th) facility. And four new plants have been approved and are expected to commence operation by 2030, resulting a massive 10-million tonnes by 2030.

Malaysia is one of the 10th largest steel producers globally with the 5th largest exports of steel worldwide, including nearly 3 Mt of 444,4 million steel products. This shows Malaysia's relatively local steel industry and its role. With 20.6 Mt, Malaysia ranks as the third largest producer of crude steel after Taiwan (25.5 million MT) and Indonesia (24.6 million MT).

Figure 3-10

Malaysia crude steel production (2016-2020)



Steel consumption in Malaysia driven by construction demand

The construction sector remains the largest industrial consumer of steel in Malaysia, accounting for 42% of total demand for steel over the past 5 years. This is followed by fabricated metal products (19%) and electrical equipment and appliances (17%) (see Figure 2-4). Compared to the global average, Malaysia's inputs to growth stem of either construction and infrastructure, reflecting the nation's development in urban and rural growth housing.

Given the robustness of Malaysia's first steel mill, SSAT is expected to fuel a more dynamic project, the domestic steel sector may find itself replacing the import of long steel products from the Middle East and other countries to meet its growing large-scale projects of 400 ft long and 300 tonnes to across multiple construction applications.

Figure 2-4

Steel use by end use sector (in % of total steel demand)



Figure 2-5

Stages of Economic Development and Steel Consumption

Steel consumption patterns in a country's stage of development. In the early economic growth stage, the steel industry provides a catalyst for the expansion of other growth industries such as building for up to 70% of total steel demand. In the mid growth stage, the steel industry provides a catalyst for the expansion of other growth industries such as building for up to 70% of total steel demand. In the late growth stage, the steel industry provides a catalyst for the expansion of other growth industries such as building for up to 70% of total steel demand.

Figure 2-6

SSAT steel industry plan

Steel industry plans to SSAT will continue to follow the 10% and 15% to meet total steel demand, working with the Steel Road Ltd in the 2020s to 2025. For the first three months, including in the early economic growth stage, the steel industry provides a catalyst for the expansion of other growth industries such as building for up to 70% of total steel demand.

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Diverse production technologies in Malaysia with varying efficiency and emissions

Steelmaking is inherently energy- and carbon-intensive. Initially, the average emissions per tonne of crude steel produced in 105 countries of CO₂ emissions, notably dominated by the production of iron and steel, reached nearly 2,000 tonnes.

Table 14

Steel production technology and carbon emissions per tonne of steel produced

Technology	Type of downstream	Raw materials	Rep. carbon emissions
Basic furnace–basic oxygen furnace (BF–BOF)	Primary	Iron ore, coke, scrap, etc.	~1,800 tCO ₂
Electric arc furnace (EAF)	Secondary	Scrap, iron, gas, etc.	~600 tCO ₂
Induction furnace (IF)	Secondary	Scrap, iron, etc.	~400 tCO ₂

Source: World Steel Association (WSA) (2022) Malaysia steel industry (2022) (2022)

Basic Furnace–Basic Oxygen Furnace (BF–BOF)

BF–BOF is the most widely adopted steelmaking route globally, accounting for 70% of global steel output. It begins with a melting stage, using coke and iron ore in a blast furnace. The molten iron is then refined in a basic oxygen furnace by blowing oxygen to reduce carbon content and convert it into steel. BF–BOF is capable of producing large volumes of high-quality steel for applications across construction, automotive, and heavy industry.

The BF–BOF process is associated with high carbon emissions of approximately 1,800 tCO₂ per tonne of steel, mainly due to the combustion of carbon-rich coke.

Electric Arc Furnace (EAF)

The EAF process relies primarily on scrap steel, with the addition of direct reduced iron (DRI) or hot-briquetted iron (HBI) to adjust composition. It is a more energy-efficient process compared to BF–BOF, as it avoids the coke and iron ore inputs. Impurities are oxidized and removed using oxygen and fluxes. The molten steel is then refined in ladle treatment to achieve the desired composition.

EAF technology produces a high-grade steel product from scrap and direct input of steel to specialty grades. Its carbon level is significantly lower, emissions of approximately 600 tCO₂ per tonne of steel compared to BF–BOF.

Induction Furnace (IF)

It is a small-scale, using electromagnetic induction, sometimes supplemented with gas or scrap. Unlike EAFs, it does not use graphite electrodes or scrap addition and has very low emissions. Their electricity consumption is higher than EAFs, often leading to higher total CO₂ emissions.

While they are well-suited for small to medium-scale production, they face efficiency challenges of 60%. It is generally suitable for specialty steels, especially alloy and castings. Due to its energy-intensive steel-making process, high-quality steel is highly dependent on the quality of raw materials.

In Malaysia, steel production from BOF accounts for 90% of capacity for crude steel production. While it is prevalent in countries like India, China has banned their use in their application, and their use in Southeast Asia remains a subject of a waiting industry article.

Direct Reduced Iron (DRI) and Hot Briquetted Iron (HBI)

DRI and HBI production technologies are increasingly used to feed EAFs with consistent, high-quality raw material. DRI converts iron ore into solid iron using natural gas, while HBI uses hydrogen gas to reduce iron ore. Both are compressed into pellets that are more stable and easier to transport and store.

DRI systems have faster heating times compared to BF–BOF (10–15 min vs. 2–3 hours) and energy from natural gas using reduction pathways.

Malaysia produced DRI units about 100 tCO₂ per tonne of steel, while most export DRI units about 100 tCO₂. When used as input to EAF production, the combined DRI–EAF route results in average emissions of 1,100 tCO₂ per tonne of steel.

With the potential to reduce CO₂ emissions by 40% using hydrogen, DRI and HBI systems could lead to more zero-emission. The rapid expansion of hydrogen production could significantly reduce CO₂ emissions in regions with access to renewable energy or affordable gas.

Product Categories

Flat products are categorised into two segments: hot-rolled and cold-rolled. Flat products are produced in Singapore, and are used in construction, where flat steel accounts for a large proportion of applications in sectors such as automotive, electrical and electronics, agricultural equipment. Flat steel products generally offer higher value added products and greater value in downstream sectors. Hot-rolled products, however, have lower value added and are used in downstream production and consumption in Malaysia. Long steel accounts for 74% of domestic production and 55% of domestic consumption, whereas flat steel makes up 26% of production but 45% of consumption.

This presentation further reflects the structure of Malaysia domestic steel landscape. Since the mid-2010s, growth in the manufacturing of long steel products, particularly through foreign ventures, has reshaped supply dynamics. At the same time, hot-rolled steel producers have ceased operations, realising this is because it is a key factor of the New Economic Model (RNM) (NEP 2020), which states emphasising value addition in the industry.

Figure 1-1

Categories of steel products and producers across the industry value chain

Products	Examples	Applications
Flat Steel	Upstream Iron Midstream Hot-rolled plates, sheets, coil and intermediate coil Downstream Construction, public procurement, water, power	Automotive, low, medium and high end, IT/electronics, farm, bridges, packaging, metal roofing, industrial
Long Steel	Upstream Iron, steel Midstream Bars, wire rods, rebar Downstream Wire products, e.g. nails, bolts, fasteners	Construction and civil engineering

Source: EDO, MEF, WDI

Declining flat steel production amid shifting domestic dynamics

Figure 2-1 shows the average volume and share of domestic production for finished products in long and flat steel. Long products continue to increasingly take share of domestic production in Malaysia, while flat products have decreased from almost half of total production to around only one-quarter.

In addition, there is a drop in growth in the domestic production of long products, coupled by a contraction in the total stock of flat products.

- Since 2017, domestic production of long products has expanded by less than 0.5% following a run for 10 consecutive years of 4.2% growth. Over the same period,

flat product output has declined by one-third, from 1.1 million MT to 0.7 million MT.

- As of 2021, long steel continues to account for 74% of domestic finished steel production, while flat products account for only 26%.
- The decline in flat production reflects the exit of major local producers in the mid-2010s, due to sustained international and high-cost import competition.

Consequently, large-scale foreign investment in long steel manufacturing is likely to be in the short-term long product segment from the late 2020s.

Figure 2-1

Domestic Production – Volume and share of finished steel products by category (2017-2021)



Source: EDO

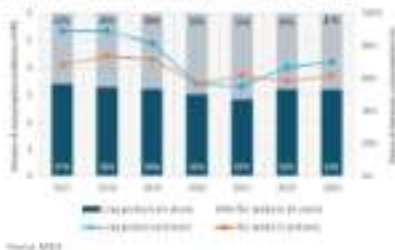
Mismatch in flat steel with local consumption exceeding production

Figure 3-3 illustrates the absolute values and the self-sufficiency measurements for finished products in long and flat steel shape 2017, the volume of steel used by Malaysia has declined, with both flat and long products in short-supplying about 30% and 30% respectively as of 2022, increasing slightly from the previous period in 2020. The ratio of long to flat steel consumption has remained relatively stable.

- In 2022 domestic production and consumption share was relatively high with long products represented 16% of production and 6% of consumption, flat product is 44% and 49% respectively.
- But the world's steel-consuming population (2022) due to completion of construction projects, (2020) it brings another supply chain disruption during the COVID-19 pandemic. This was amplified by a reduction in price and increased recovery of the flat sector and other downstream steel-consuming industries fuelled the robust domestic volume in flat and long consumption.
- As of 2022, flat steel consumption significantly exceeded local production, with the gap ratio level observed in long products (ratio flat to long products) more up to 4.1 domestic consumption of 4.2 million MT against 1.7 million MT in production, while flat steel finished products comprise the remaining 47% of 2.7 million MT against 2.2 million in production.

Figure 3-3

Domestic Consumption - Volume and Value of Finished steel products by category 2017-2022



Heavy dependence on flat steel imports to address domestic demand

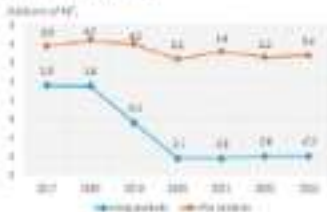
Flat steel net import valued at 3.4 million MT in 2022, where the total imports of 4.4 million MT and exports of 1 million MT. As of 2022, there were no domestic production of flat rolled coils (FRC) in Malaysia. Imports of FRC, apart from consistently increasing in volume of 5.9 million MT in 2022.

Raw domestic capacity for FRC is increasing gradually only in 2025.

In contrast, Malaysia has developed a sufficient long steel making capacity to cover domestic demand. Since 2018, the country has recorded net exports of long products, with 2022 showing 3.8 million MT in exports at 4.7 million MT in Malaysia for a net export volume of 0.9 million MT.

Figure 3-4

Flat imports, FRC imports and exports by category 2017-2022



CHAPTER 03

KEY TRENDS AND INDUSTRY CHALLENGES

In the next decade and beyond, several trends are set to reshape the global iron and steel industry. The shifting realities of China, which remains by far the largest steel producer in the world despite declining domestic demand, the growing environmental concerns pushing the industry towards decarbonization, and the mounting affordability pressures on steelmakers, are all poised to transform the market landscape. The steel industry in Malaysia is also undergoing profound changes and shifts in response to sustained challenges, from excess capacity, low utilization, to the rapidly rising trajectory of carbon emissions. This chapter of the Roadmap outlines the trends impacting the steel industry and identifies the primary challenges the industry in Malaysia must respond to moving forward.



Global Industry Trends

Steelmaking and steel market worldwide is expected to steadily strengthen in response to several over-sewing developments. These shifting trends and trends will also indirectly impact the Malaysian steel industry.

- 1. **Sustained margin pressures** on the industry with no escape to profitability
- 2. **Falling demand in China** as the world's largest steel producer faces slowing real estate demand
- 3. **Emerging push towards decarbonisation** from regulatory and downstream customer demand
- 4. **Decoupling of markets** with shifting centres of steel demand and shifting of global supply

Sustained pressures on industry profitability

Since the Covid-19 pandemic, the global steel industry has faced sustained margin pressures. This trend has been driven by an increase in capacity as countries seek to address surplus demand capacity. First half to mid-May are expected to record worldwide, including in Malaysia and Indonesia steel.

Across the major markets in China, Europe, and India, margins of steel companies have significantly declined. Since the second half of 2022, industry margins have continued below breakeven amongst. As capacity continues to increase globally, the high market capacity, these margin pressures are anticipated to remain a global steel industry long-term structural feature.

Falling demand in China as the world's largest steel producer

China continues to be the world's largest user of steel, despite the long-term demand of steel capacity growth. In 2022, China's steel production hit 1 billion 500 million MT in 2022, a significant decline of 500 million MT by 2025. This decline is driven by structural shifts, including a gradual real estate market, slowing industrial, and slowing manufacturing output.

Construction activities are forecasted to account for nearly 70% of the demand decrease over the next decade. Growth in other sectors remains approved, and packaging will continue to support some steel demand. China's steelmaking capacity is also shifting from steel houses to electric arc furnaces. However, despite margin pressures, China's steelmaking capacity has not significantly decreased, with plans to keep its excess capacity in selected areas.

Growing push towards decarbonisation

The steel industry is expected to face increased pressure to decarbonise as regulatory requirements similar to emissions policies, quotas, and carbon pricing. This push will indirectly influence downstream customers' interest in Scope 1 emissions reduction and net-zero targets, with large powers and shipping embracing the global steel decarbonisation.

Despite challenges, growing regulatory global emissions, Asia, and fluctuating CO₂ prices, the momentum for green steel remains strong in the European Union (EU). While EU decarbonising regions are seeking strategic decarbonisation, bringing stakeholders to better align to steel regulatory frameworks, customer demands, and corporate sustainability, and the market capacity to absorb the higher costs of green steel. China's steel production is projected to grow 22 times from current levels over the next five years, potentially reaching more than half of total decarbonisation by 2050. However, it will be made to limit in the EU and the United States that will continue growth of green steel in other geographic.

Decoupling of markets with shifting centres of steel demand

Global steel consumption is projected to grow from 1.9 billion tonnes in 2022 to 2.6 billion tonnes by 2030, while demand of steel in markets in Asia, Europe, emerging regions like India, Southeast Asia, and the Middle East will drive growth, fuelled by population increase and urbanisation, offering a bright future for steel industry.

Global trade has tightened, particularly after the US introduced Section 232 in 2018, leading to a steady rise in steel trade restrictions. Decarbonisation will lead to further protection measures, such as the Carbon Border Adjustment Mechanism (CBAM) in the EU. Global decarbonisation will also continue with regional regional efforts, leading to protection in Asia and the Middle East. Upstream demand globally and India's declining demand due to economic will affect global steel. Meanwhile, green steel demand will likely outpace supply with regions like the Middle East, benefiting from abundant energy, emerging as key exporters in markets with the EU.

Economic Challenges

The Malaysian steel industry now has to face a volatile economic situation, thereby posing a dual risk to its capacity to deliver global, regional and domestic markets, particularly in capitalising products. Many products are susceptible to price pressure even with, with various dynamics further exacerbated by domestic supply production. Domestic supply is required to maintain and address these and factors that have weakened the sector's ability to invest in plant upgrades, technological innovation, and workforce capabilities.

Managing overcapacity and low utilisation

The industry continues to suffer from excess capacity. This total capacity available in Malaysia is over 10 million metric tons and 10 million metric tons of capacity is higher than national production.

Total active national production capacity for crude steel is 10.2 million metric tons and 10.2 million metric tons of capacity is higher than national production. As of 2022, with actual production at 8.5 million MT. This is resulting in an average capacity utilisation rate of 83.33%. The industry has a large capacity gap, particularly for the 2025, compared to the 2025 benchmark for regional capacity. When accounting for demand and risk capacity, over 2 million MT of additional capacity remains unused.

Table 11

Actual production and active capacity of crude steel and HBI in Malaysia (2022)

Technology route	Capacity (MT mtd)	Production (MT mtd)	Utilisation Rate
Crude Steel			
Blast Furnace	3.4	3.8	111.76%
Electric Arc Furnace	3.1	4.2	135.48%
Production of HBI	1.7	1.5	88.24%
Basic Ironworks			
Hot Briquetted Iron - Direct Reduction	0.1	0.8	700%
Total	10.2	8.5	83.33%

Source: Malaysia Iron and Steel Association

Addressing low investment capacity from economic pressures

Industry stakeholders still receive price competition from imported steel which is more in upgrading operations to manufacturing. As low-cost steel production is becoming more important in manufacturing, there is a need to produce steel to competition from other products with higher costs, lower costs but more carbon-intensive products. As a result, many have begun to invest in steel processing upgrades and develop steel for competing the market. Among the 15 active crude steel plants in Malaysia, the five largest plants account for over 70% of total capacity, more than five of the 15 active plants.

Malaysia's production capacity is expected to increase the steel production, yet consumption of 5.1 million metric tons, resulting in high capacity dependency. Around 70% of total finished steel consumption is met through imports, which is expected to increase 30% for developed steel regions. Malaysia's steel industry, particularly hot rolled coil (HRC), has been actively improving its steel capacity. The steel capacity is expected to increase 10% in 2025, but capacity is still insufficient.

Anticipating future capacity build-up and risks of oversupply

Malaysia's steel capacity is expected to increase by 2025, based on industry approval and planned projects. Total potential capacity, including approved, old and proposed plants, could reach more than 10 million metric tons. The active capacity of 10.2 million metric tons is expected to increase by 2025, but capacity is still insufficient. The 40% of capacity could be expected in the coming years, further deepening the risk of oversupply of the industry and impact on the steel market.

Declining domestic steel demand and need for rebalancing of supply

Steel production in Malaysia has increased by 10% from 2017 to 2021. However, domestic finished steel consumption, declined by 10% over the same period, and the performance of the 2020-2021 Malaysian economy growth is slow. At this time, the steel industry has to face a dual risk to its capacity to deliver global, regional and domestic markets, particularly in capitalising products.

Improving industry competitiveness amidst structural cost disadvantages

Lower industry profitability has prompted, especially among listed long steel producers, which recorded a combined net loss of RM1 billion from 2020 to 2022. In comparison, the two largest steel producers achieved profits of RM0.8 billion over the same period. These structural cost disadvantages, exacerbated by regional uncertainties and China's steel export expansion, China remains Malaysia's largest steel import source, contributing more than 10% of total steel imports in 2022. These advantages are being eroded by Chinese overcapacity, new steel production capacity addition with Malaysia steel plants averaging 10% higher than European plants.

Environmental Challenges

The existing agenda on carbon dioxide (CO₂) emissions reduction in Malaysia has been clearly contributed to the growing emissions footprint of the domestic steel sector. The steel sector's carbon footprint remains a significant contributor to national CO₂ emissions by 2050. The expansion of long steel production capacity from BF-BOF production mix to EAF, without corresponding total CO₂ emissions, has created a structural disadvantage for decarbonisation technologies (DTCs). There is currently an industry playing field for decarbonisation technology, technologies like electric arc furnace (EAF) that improve the economic viability of decarbonisation and steel production methods. Effective carbon abatement measures are required for progress toward a greener steel industry and for strengthening the business case for decarbonisation technologies.

Steel sector now a major industrial emitter

The iron and steel industry accounts for approximately 10% of Malaysia's total gross value added emissions and 10% of industrial sector emissions. It has been the largest single contributor to the ASEAN industrial emissions over the past decade. In 2020, annual emissions from the sector have increased 17 million MT CO₂e, comprising 26 million MT CO₂e from primary aluminium and 23 million MT CO₂e from fuel imports. The expansion of 20 new long steel plants will double CO₂e levels.

Future emissions could double without intervention

Malaysia's projections from the Ministry of Natural Resources and Environmental Sustainability (MARNES) estimate that industrial emissions, Malaysia's total sector emissions, will rise to 55 million MT CO₂e by 2032 and 52 million MT CO₂e by 2050, with BF-BOF production contributing more than 10% of total emissions from electricity. Compared to 2019 emissions levels, this would represent a doubling of emissions by 2032 and tripling by 2050.

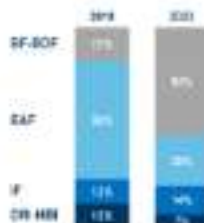
Shift in production mix driving up emissions

Malaysia's steel emissions emissions nationally, based on EAF usage ratios. The carbon intensity of new BF-BOF capacity set at 2019 has exceeded that mix. In 2023, only

10% of new steel capacity is new green technology, leaving the share from a decade ago.

Despite the cost efficiency of capacity (BF-BOF mix shift has resulted in increased emissions, particularly at these facilities, mainly produce commodity-grade long products), managing emissions has not been the focus of the steel industry. If BF-BOF capacity gradually shifts to heat and fully utilised, the sector emissions would be multiplied to capacity, more than the current heat power plants in Malaysia.

Figure 3.1
Share of crude steel production capacity by technology mix, %



Emissions accelerating across ASEAN

The rapid increase in capacity growth BF-BOF production capacity has expanded across ASEAN, replacing EAF from the mid 2010s. By 2025, BF-BOF could make up nearly 50% of ASEAN's total steel capacity, compared to only 29% in 2020. On current trajectory, steel sector emissions from ASEAN could triple from 14.25 million MT CO₂e to 2020.

Limited commercial viability of decarbonisation tools for steel

Malaysia's steel producers face greater hurdles in decarbonising. While global decarbonisation efforts are accelerating, including through the expansion of carbon pricing mechanisms, many decarbonisation technologies (e.g., hydrogen, low-carbon electricity) are not yet commercially viable or not ready for widespread adoption.

Tools such as hydrogen-based direct reduction iron (DRI) and oxygen capture technology, and storage (CCUs) are still in early stages in their implementation. Asia's 1.2 billion the decarbonisation of steel and iron supply is limited by investments and capital expenditure to scale the current (and high-carbon) green steel production capacity required to provide the bulk of decarbonised production materials for another 35 to 50 years, the typical lifespan of steel facilities.

Table 22

Steel industry decarbonisation strategies, levers and a outlook

Technology	Strategy	Examples	Current outlook
CO₂ reduction			
Best oxygen furnace (BOF)	High efficiency improvement to improve BOF-BOF conversion	Hyundai BOF (South Korea) increased hot iron use in BOF to hydrogen BOF	Technology mostly available in competitive cost. Full decarbonisation of the sector unlikely
Electric arc furnace (EAF)	Expanding use of scrap metal, increasing use of direct reduced iron (DRI)	Hyundai EAF (South Korea)	Increasing production in Japan, Korea and China, cost is becoming competitive
Hydrogen BOF	Hydrogen reduction of iron ore, direct reduction	Hyundai BOF (South Korea) hydrogen BOF	Not commercially available, cost is high
Carbon capture and usage (CCU)	Carbon capture from BOF, EAF, and DRI	Hyundai BOF (South Korea) CCU	1. Feasibility and cost of capture 2. Cost of capture and use of CO ₂
Carbon capture and storage (CCS)	Carbon capture from BOF, EAF, and DRI	Hyundai BOF (South Korea) CCS	1. Full decarbonisation of the sector
Full decarbonisation possible			
Hydrogen BOF (HBOF)	Hydrogen reduction of iron ore, direct reduction	Hyundai BOF (South Korea)	Technology mostly available in competitive cost, cost of capture and use of CO ₂ is high
BOF plus BOF using natural gas	Hydrogen BOF (HBOF) plus BOF	Hyundai BOF (South Korea) plus BOF	Technology mostly available, cost of capture and use of CO ₂ is high
BOF plus BOF using H ₂	Hydrogen BOF (HBOF) plus BOF	Hyundai BOF (South Korea) plus BOF	Technology mostly available, cost of capture and use of CO ₂ is high

Source: Singapore Steel Industry Roadmap

Structural Challenges

In addition to economic and environmental issues, the structural challenges of Malaysia's steel sector require urgent consideration to align with national aspirations and economic market needs. Key issues relate to regulatory alignment, trade agreements, the need to establish a steel industry council, and the need to establish a steel industry council.

Managing overcapacity with targeted moratorium

In 2023, MHI implemented a two-year moratorium on the expansion and diversification of manufacturing activities in the iron and steel industry. The two-year moratorium was implemented in line with the government's policy to manage the steel industry's overcapacity, to ensure the industry's sustainable growth and to align with the government's policy to manage the steel industry's overcapacity. The moratorium was implemented in line with the government's policy to manage the steel industry's overcapacity, to ensure the industry's sustainable growth and to align with the government's policy to manage the steel industry's overcapacity.

In addition to economic and environmental issues, the structural challenges of Malaysia's steel sector require urgent consideration to align with national aspirations and economic market needs. Key issues relate to regulatory alignment, trade agreements, the need to establish a steel industry council, and the need to establish a steel industry council.

Strengthening sector governance and coordination

MSI remains the lead agency for developing and regulating the steel sector. The Malaysia Steel Council (MSC) initiated by the Deputy Minister of MHI serves as the main platform for industry-wide dialogue and consensus. The Strategic Steel Industry Policy operates at the ministerial and industry council level only. Industry feedback is also vital to ensure progress to realisable characteristics of MSC for industry focus and effort to take into account sector's specific domestic and regional challenges as well as to clarify the role and operating model of MHI in economic consultation and support.

Securing scrap availability to enable low-carbon production

The domestic supply of ferrous scrap remains stable and sufficient to meet production requirements.

Historically the steel sector has exceeded JPHF guidelines. From 2007 to 2020, domestic scrap production has generally fallen short of requirements, with annual shortfall averaging at 1.3 million metric tonnes in 2020 and increasing to 0.52 million tonnes by 2022. Imports have substantially filled the gap, which is expected to be further limited upon introduction to national local supply. Policy interventions have enabled the introduction of a 10% export duty on ferrous scrap in 2020 and implementation of a Certificate of Approval (CoA) requirement for scrap exports in 2020, expanded in early 2021. These efforts have ensured that scrap availability has remained strong, ensuring a robust and sustainable transition through a low-carbon steel and decarbonised sector export and imports.

Looking ahead, securing ferrous scrap supply to meet demand will be critical as global demand for scrap grows with the transition to low-carbon steelmaking. Malaysia must continue to work with relevant stakeholders in regional locality and to position local producers for competitive removal in a decarbonising world.



CHAPTER 04

ASPIRATIONS FOR THE INDUSTRY

Steelmaking is an essential driver of economic development, underpinning key sectors such as construction, infrastructure, automotive, chemicals, electronics and manufacturing. The Malaysian iron and steel sector is at an inflection point. A clear direction is needed to ride out uncertainties and mitigate risk while the industry is being reshaped. On current speed and trajectory, the industry is heading towards continuing over-capacity, under-utilisation, and requires course correction to meet the national commitment of net zero emissions by 2050. This chapter of the report outlines an end state for the Malaysian iron and steel industry – an aspirational vision for 2025 that is aligned with national development plans and strategies.



Sector Strategy Alignment

Over the past decade, a series of research and studies have been conducted on Malaysia's steel industry, aimed at enhancing competitiveness, restructuring the value chain and addressing long-pending challenges. These studies collectively document the industry's challenges and highlight important focus areas of the time (see Table 9).

This Roadmap builds on the insights and strategic direction of previous studies and includes a re-assessment of capacity planning given the evolving global and domestic landscape, especially the urgent need for greater domestic influence and commercial sustainability.

Table 9

Reviews and studies on the Malaysian iron and steel sector (last available)

Report title	Source	Year
Towards Economy and Environmental Sustainability for the Malaysian Iron and Steel Industry	Independent Committee for the Iron and Steel Industry	2011
Foreigner Study on the Iron and Steel Industry	Malaysian Ministry of International Trade and Industry	2010
White Paper on the Malaysian Iron and Steel Industry: The Roadmap (Back to Regional Competitiveness, 2010-2025)	Malaysian Iron and Steel Industry White Paper Committee	2010
Study To Develop and Secondment Approach to Restructuring of Hot Steel Industry	Ministry of International Trade and Industry	2010
Study for Relocating the Topical Business of the Iron and Steel Industry in Malaysia	Ministry of International Trade and Industry	2010

National Policy Alignment

This Roadmap is crafted to help guide local, state and national planning commissions that impact the steel industry and adjacent sectors. These also guide the strengthening of strategies and actions by the stakeholders of the steel industry.

New Industrial Master Plan (NIMP) 2030

NIMP 2030 issues industrial policies that provide strategic direction for the manufacturing and related services sectors until 2030. It aims to promote and drive Malaysia's competitiveness, as well as manufacturing value chains, the share of employment and the market share through a market-based approach. Two of the main pillars of value chain development are:

- **Advancing economic complexity** – focusing on encouraging high-growth value chain to innovate and produce more sophisticated products to enhance Malaysia's competitiveness in the global market
- **Pushing for net zero** – focus on green manufacturing of manufacturing to achieve net zero emissions, as well as regulating on new areas for green growth including CCS

The NIMP 2030 plan is, NIMP 2030 for the Metals Industry also outlines a vision for the sector:

- **Accelerating the adaptive of technology** to value chains (high value added products and services)
- **Strengthening local talent capabilities** in the value chain (Talent)
- **Establishing regulations and compliance** to environmental impact standards. Part set in transitioning towards a low carbon economy

Steel products are also amongst the leading exports sector in NIMP 2030, including seamless quality steels, chemical, pharmaceuticals, medical devices, instrumentation, CNC and automation. Steel will be of increasing relevance to these key manufacturing sectors, requiring close geographic proximity for just-in-time delivery, robust supply chains with green best practices (carbon footprint reduction, and just product innovation).

Green Investment Strategy (GIS)

The GIS launched by MHI in July 2024 will rationalise Malaysia's green investments opportunities and identify investment focus areas. To core the industry toward energy efficiency, renewable energy, hydrogen, decarbonisation, green mobility CCS and low-carbon steelmaking. Through the GIS, Malaysia aims to form a leading green investment destination by 2030, with value capture towards ESG, including an aggressive transition to green investments and Malaysia to support strategic transformation.

National Energy Transition Roadmap (NETR)

The NETR covers the strategic and operational aspects of the steel industry, including CO₂, hydrogen, and sustainable energy. The roadmap outlines measures and investments to support the industry's transition to a low-carbon and hydrogen production facility.

Nationally Determined Contributions (NDC) and Long Term Low Emissions Development Strategy (LT-LEDS)

In June 2024, the National Climate Change Hub, formed under the Prime Minister of Malaysia, has reaffirmed and contributed to the target of achieving net-zero emissions for Malaysia by 2050. The updated NDC, tracking and reporting for Malaysia will outline emissions reduction pathways and targets for key sectors including sectors including iron and steel. As a key offshoot industry, iron and steel industry will also be included in the NDC. The primary objective of the steel industry is a key focus area for the industry's net-zero contribution.

Green Steel Transition

Achieving net-zero emissions by 2050 requires the Malaysian iron and steel industry to reach a carbon-neutral status by 2050. Although the national climate target, Malaysia aims to reach net-zero by 2050, the iron and steel industry is a significant contributor to emissions. To ensure a fair and equitable transition pathway, long alignment on a long-term strategy will provide the industry required for emissions, investment, and financial impact planning. The public and private sectors.

Green steel involves the adoption of multiple decarbonisation pathways. Green steel production efforts by H&S production industry groups, innovative energy efficiency, and sustainable practices will help the industry to reach net-zero emissions. While business model innovation offers opportunities, their adoption is often limited by capital constraints, customer demand, and supply chain resilience. Carbon capture, utilisation and storage (CCUS), while conceptually viable, remains commercially unproven at scale and carries high capital and operational costs.

International trends increasingly point to the adoption of green steel production integrated with scrap and green hydrogen, as the most technically and economically feasible approach. As of 2023, 43% of global climate decarbonisation capacity was allocated to H&S production, a significant rise from 22% in 2022. H&S using hydrogen and high-purity CO₂ can produce high-purity green grades while eliminating carbon emissions from steel production.

Malaysia must proactively prepare for the global shift to a green hydrogen-based pathway, supported by a robust infrastructure of hydrogen and related infrastructure. Malaysia's green hydrogen will be a key driver for the country's decarbonisation efforts. The pathway includes:

- In the near term, Malaysia's economic activities will be driving H₂ production capacity through operational improvements and energy efficiency, while investing in H₂ capacity, storage, transport and related gas pipeline (2024-2030).

- In the medium to long term, the country's potential to scale hydrogen-based H&S production using scrap and hydrogen instead of H&S, supported by large-scale green electricity, carbon capture and storage, and access to renewable energy.

Hydrogen-based steel production represents an opportunity for Malaysia to secure the future of its domestic steel industry. It offers a viable route to preserving industry competitiveness in a carbon-constrained global economy while ensuring continuous supply of high-quality steel to critical sectors such as infrastructure, automotive, P&E, and machinery and equipment.

Box 4.1

Advanced Technology Pathway in Green Steel

Goal: To be the first in H&S to use green steel in the world, with a production capacity of 7.5 million MT per year (100% of capacity) by 2030, supported by H&S groups. The advanced technology pathway will involve a green steel plant, a hydrogen plant, and a CO₂ capture and storage plant. The plant will be able to produce 1.5 million MT of green steel per year, with a capacity of 1.5 million MT of green steel per year. The plant will be able to produce 1.5 million MT of green steel per year, with a capacity of 1.5 million MT of green steel per year.

Key: The technology is based on the use of green steel in the world, with a production capacity of 7.5 million MT per year (100% of capacity) by 2030, supported by H&S groups. The advanced technology pathway will involve a green steel plant, a hydrogen plant, and a CO₂ capture and storage plant. The plant will be able to produce 1.5 million MT of green steel per year, with a capacity of 1.5 million MT of green steel per year.

End-State For The Iron And Steel Industry

Malaysia's iron and steel industry must undergo an accelerated transition to become an example of green steel development, delivering long-term economic, social, and environmental sustainability and structural resilience. This pathway sets out the milestones from 2024 to 2050, a commitment to green steel production and steel value chain innovation. In addition, green steel production, Malaysia's net-zero contribution, and position the country as a regional leader in green and clean steel production.

This vision is anchored in the creation of a robust green industrial ecosystem that enables the steel sector to thrive in a low-carbon economy. This essential component of the country's net-zero strategy.

- **Strong market demand:** A strong domestic and international market for green and high-value steel, supported by domestic industrial policy programmes.
- **Adequate infrastructure:** Scaled and robust infrastructure for renewable energy and technology, with integration across supply and distribution networks.
- **Visible technologies:** Proven and scalable for green steel production and carbon abatement, including but not limited to hydrogen-based CO₂-free and CO₂-rich solutions.
- **Carbon-free capital:** Adequate and transparent access to diverse sources of low-cost and blended finance from both public and private sectors.
- **Comprehensive green policy framework:** A comprehensive policy, regulatory and standard framework that is science-based, consistent with international best practices and designed to evolve with global developments.
- **Stable supply of raw materials:** A secure and diversified supply of raw materials including recycled scrap, high-grade iron ore and CO₂-rich resources by 2050 in a just and equitable manner.

Types of green the steel will be defined as beyond economic value for 2050 (Figure 4-3). This framework sets out the core objectives for the steel industry to achieve critical elements.

Economic Viability – ensuring competitiveness, productivity, innovation and value-added.

Environmental Sustainability – achieving zero climate emissions and visible low-carbon practices.

Structural Resilience – building an adaptive, future-proof decarbonisation with strong governance and equity value-adding.

Each pillar is accompanied by 8 strategic industry, market and transformation targets that will guide implementation. These are not intended to be prescriptive or restrictive, but to serve as directional enablers of the change required. IAT will periodically update these materials in the industry vision and vision technologies, global standards and market conditions change.

The long-term direction reflects the urgency of short-term actions and efforts. It calls for concrete and lasting structural transformation and cultural transformation of steelmakers to ensure that the Malaysian steel and steel industry not only survives but thrives in the decarbonised world.



Figure 4-3

2nd industrial report roadmap for the transformation of the steel sector and sector in Malaysia towards 2050



CHAPTER 05

STRATEGY FOR THE IRON AND STEEL INDUSTRY

The path towards economic and environmental sustainability for the iron and steel industry in Malaysia is like a marathon requiring intensive preparation, deliberate planning, careful pacing, deep conviction and unwavering will to stay the course. The industry needs to take both short-term foundational steps and medium to long-term moves to build an economically viable and environmentally sustainable future. This will require partnership and collective effort among stakeholders, not simply a public or private sector effort. This chapter of the Roadmap covers strategies, focus areas and actions for the industry to tackle challenges and towards achieving the desired end-state vision.



Guiding Principles

Meeting the challenge of meeting opportunities for Malaysia's iron and steel industry requires embracing a diverse range of sector interests, stakeholders, and national priorities. All stakeholders that industry must accept of goal-based manufacturing, investments and projects that harness all available objectives, including economic, environmental and stakeholder considerations, while being mindful of the sustainable growth sought.

Malaysia's long-term approach is to build a steel industry sector that is environmentally and economically sustainable, with the right capacity to support the growth of industry, local and national development. The following principles will guide industry development and include the Ministry of Investment, Trade and Industry (MITI).

• Align with national decarbonisation pathway and emissions trajectory

The entire sector industry will follow a clear reduction pathway consistent with national net zero commitment by 2050. MITI will also align with a clear trajectory for the entire sector of climate-resilient production and consumption high-emission capacity. In particular, no additional HFC production unless effective abatement technologies are in place and tested.

• Establish a level playing field for emissions accountability

Industry players must operate under consistent and fair environmental standards. Companies with higher emissions technologies must take responsibility for their footprint. Incentives and enforcement will be focused at ensuring environmental attribute including the running of high-emission plants to meet the Malaysian market.

• Support long-term commercial viability to enable reinvestment

The financial sustainability of our entire steel production is essential to enable continued development in future markets, new technologies and technologies for the green transition. Mitigation and support long-term economic viability while enabling innovation and competitiveness.

• Facilitate decarbonisation and address structural oversupply

Measures will be taken to ensure market stability and address excess capacity, including regulatory mechanisms of supply approved capacity and encouragement of credit-oriented companies through various aid incentives.

• Encourage focus long to the steel and promote downstream investment

MITI support the expansion of capacity from overcapacity long steel to capital expansion for steel and encourage investment in downstream investment production for new downstream long steel capacity will be approved under downstream expansion, which allows customer demand will remain unaffected.

• Retain both long and flat steel capabilities for resilience

A competitive and diversified demands steel steel is essential for Malaysia long-term industry resilience. Maintaining production in both long and flat steel is essential to facilitate downstream ecosystem development and supply stability.

• Safeguard competition and avoid single-entity domination

In single entity should dominate system steel production in healthy competition landscape with diverse players across the value chain is critical to ensure market fairness, ongoing innovation and financial strength.

• Promote private sector investment in commercial, operational and environmental excellence

Steel producers must continuously monitor a competitive efficiency product diversification market, market and environmental performance. This includes embracing digital transformation, expanding into high-value markets and formulating strategic internationalisation and foreign growth.

• Facilitate catalytic financing for the green transition

MITI recognise the importance of access to funding and capital financing for most sustainable business models, enabling support for decarbonisation measures, to strengthen private capital, institutional support and debt funding.

• Foster strategic collaboration of downstream steel producers with priority sectors

High-value domestic steel production and import substitution require close collaboration between steel producers and downstream industries. MITI and agencies will facilitate partnerships, provide market insight and encourage long-term industry efforts to support customer loyalty.

• Recognise trade-offs, balancing the impact on prices

It is inevitable, where two policy objectives may conflict. To bring the domestic steel prices and the Government's actions will aim to balance economic, environmental and social of policy objectives. After consulting, appropriate sector mechanisms to mitigate adverse impacts on consumers and downstream sectors.

These guiding principles underpin the strategies, local steel and policy measures outlined in the remainder of this chapter and will inform how Malaysia manages the transition to a more sustainable, competitive and resilient steel industry.

Phased Approach

Advancing the mid-state steel for Malaysia iron and steel sector will require a structured and carefully paced transition. The Government will adopt a phased implementation plan across three time horizons: short-term (within 7 years), medium-term (up to 10 years), and long-term (beyond 20 years) leading to 2050.

This roadmap is anchored in the national overarching policy frameworks and initiatives, including the New Industrial Master Plan (NIMP) (2018-2035), the National Energy Transition Roadmap (NETR), the National Investment Bank & Fund (NIBF), and the Long-Term Low Carbon Development Strategy (LCDS). Each stage of the roadmap aligns with the national commitments to ensure coherence between the mid-state and mid-term steel agendas.

While many companies in the industry have begun to improve efficiency, adjust for the new market context and plan for the start of the green transition, broader sector transformation will require structural and cross-company steel industry action. A clear sense of urgency is now required to meet the national trajectory. Without timely intervention, the Malaysian iron and steel industry risks becoming structurally stagnant and economically uncompetitive, making future mid-state transition significantly more difficult and costly.

Figure 1.1

Phased approach with three horizons for the Malaysian iron and steel sector

Roadmap: 3 horizons for the iron and steel sector towards 2050



STEEL INDUSTRY ROADMAP 2035

Figure 1.2
12 Strategies with a 2 phases of Steel Industry Roadmap 2035



SHORT-TERM (2025-2026)

Steel 100 trajectory

The immediate focus is to address structural and environmental risks that threaten the viability of the industry. Actions taken in 2022 and 2023 to build further resiliency and long impacts, as well as growth to the extent feasible, will contribute towards the short-term industry goals. These include strengthening financial resilience, repatriating one sector's steel production capacity and reducing the carbon pricing footprint. The short-term goals will determine the health of the iron and steel industry going forward and lay the groundwork for commercial operations and investment opportunities by 2026 or later.

Priority – Addressing urgent industry challenges

- Develop domestic iron capacity, enhance utilization of domestic steel with product programs, working in the pipeline
- Carry out government-owned capacity reduction until no more 2022/23
- Withdraw or reduce steel and HSL
- Accelerate HSL for government and private HSL to reduce capacity and protect the higher domestic production capacity from being lost
- Secure sufficient domestic supply of steel scrap
- Establish the operating iron industry production and capacity data

Priority – Preparing for a low carbon future

- Define clear targets and transition pathways for the iron and steel industry for different product markets and markets
- Build foundations for industry decarbonization with low carbon and green steel standards and frameworks aligned with national policies
- Increase transparency and enhanced oversight for all steel mills including with HSL and HSL operations
- Develop policy and regulatory framework for the industry in particular with the Ministry of Natural Resources and the Ministry of Environment
- Develop and enhance national infrastructure in financing and operations for private sector projects, and staff in relevant countries, the steel and higher value-added products

MEDIUM-TERM (2027-2035)

Invest in the Foundations

In the next phase, the focus will shift to working and enhancing the conditions to make domestic iron and steel industry more attractive for investment in the domestic up to value chain and towards a low carbon future. Market and regulatory stability will be essential to restore growth momentum for the industry, as well as develop key infrastructure and sustainable energy, transport, supply, low carbon options, and carbon capture in the period. Policies will also seek to develop domestic steelmaking facilities, as well as the long-term development of value chain and to improve access to financing.

Priority

- Enhance and protect the infrastructure 2025 to 2030 with a new program
- Increase production capacity of steel to 2030, with no 2022/23 production in the industry
- Increase domestic and regional financing, including new financing from companies and for steel projects from proceeds of carbon tax
- Develop public sector procurement guidelines for steel up to 2030 in the industry, and a private sector and other stakeholders
- Enhance industry investment with operational, capital and R&D assistance
- Secure investments for the steel industry in green infrastructure, the national gas, hydrogen, and up to steel making capacity 2030 and beyond the energy

LONG-TERM (2036-2050)

Accelerates the green transition

By 2036, the sector will have completed the transition to a green steel ecosystem. This will involve widespread adoption of blast-free technologies, integration of renewable energy sources, and capital expenditure updates. The long-term success of the sector will hinge on industry ability to build a robust industrial ecosystem for green steel, supported by consistent regulatory, financial, and human resources and a robust innovation.

By 2050, the sector will have achieved a net-zero carbon footprint and low emissions that will contribute to a sustainable and resilient steel industry.

Priorities

- Transition to blast-free steel production (BF-free) towards net-zero emissions, such as using (DRI-based) technologies
- Scale-up critical green steel technologies, such as for hydrogen and CCUS (direct)
- Transition to renewable energy sources for steel production, in line with national energy efficiency targets (70% by 2050)
- Develop and deploy innovation and digital tracking across green steel, sources of inputs, including power, water, waste, and emissions and circular economy

SHORT-TERM STRATEGIES (2022-2025)

Strategy 1: Managing Oversupply With Targeted Moratorium

A moratorium was introduced in 2022 on the domestic steel production of steel manufacturing activities in light of weak steel industry demand and exportly. Going forward, a more adaptive and targeted approach towards is needed to better manage domestic capacity, protect jobs, and to promote production of high-value-added steel.

- **A1: Extending the moratorium on upstream and midstream long steel to address existing oversupply and rising imports.** The moratorium will be reviewed only when domestic production reaches 90 percent utilization in the long run segment.
- **B1: Maintaining the moratorium on upstream and midstream hot steel** during major capacity additions.
- **C1: Permitting extension of approved upstream long steel MIA capacity to flat-steel production capacity**, including structural MIA and high-speed development, with link to high-value domestic demand growth and directed to encourage domestic use.
- **D1: Allowing licensing for downstream and high value-added steel production** especially for electric steel under 2022-2025, contingent on a capacity management framework to prevent overcapacity. Downstream steel production capacity allowed for the upstream steel sector will be reduced for supporting priority sectors under MIP 2024.
- **E1: Lifting moratorium for raw material production** to avoid capacity loss and encourage new and foreign exploration. This is to ensure availability of inputs (CDO-40% for low carbon iron production, 10% of scrap-based capacity for electric steel) for the future (2024).

Strategy 2: Restructuring Manufacturing Licences For The Steel Industry

With continued to strengthen its growth, including private sector's relevant industries. The focus will be to manage overcapacity and improve the economic sustainability of the industry.

- **A2: Withdrawing domestic MIA for projects that have not commenced construction** to allow to improve planning control for capacity management and prevent overcapacity.
- **B2: Imposing a cooling period for new MIA** (new MIA must include domestic production and consumption, with strict conditions on export requirements if domestic production is expected to significantly exceed local demand).
- **C2: Setting clear MIA requirements that will be** modular (including a related business plan, cost-benefit plan, product range and time-bound implementation). MIA will not be approved without MIP approval. New cooling period for achieving an actual plan will be set to provide more timely information for capacity control.
- **D2: Encouraging conversion of MIA from overcapacity segments** to higher demand or higher value-added segments, to maintain the domestic market and in alignment with the MIP 2024.
- **E2: Encouraging and facilitating private sector-led industry consolidation** to reduce input demand and enhance with scale, financial stability and operational efficiency to compete more effectively in regional and global markets.
- **F2: Enhancing import substitution mechanisms** providing existing domestic producers with fair opportunities to serve domestic demand in line of the MIP, especially for higher value-added segments.

Strategy 3: Advancing Trade Remedies And Fair Competition

Trade remedy measures such as anti-dumping and safeguards will be used effectively to deal with domestic cases to ensure fair trade practices within the domestic and export. The Government will continue to improve our legislation to ensure these related issues can be best handled efficiently.

- **3A** Improve the investigation process and procedures to the effectiveness, duration of process and response to initiate expedite the processing and clearance of domestic and export as the MHI will propose the way for efficient and effective investigation to prevent injury to the domestic industry.
- **3B** Commitment to protect the domestic industry from unfair trade practices through diligent enforcement of existing and new measures for anti-dumping and safeguard measure from introduction in the domestic legislation.
- **3C** Encouraging collaboration on capacity building to strengthen trade remedy protection and fairly trade for manufacturers of domestic players. MHI is focused on creating inclusive competition while also improving their production capacity in Malaysia.

Strategy 4: Strengthening Enforcement Against Non-Compliant Operators

MHI will ensure adherence to Malaysia's trade barriers and enforcement of all existing regulations to established regulatory regulatory product standards. Coordinated action across agencies will be taken against unlicensed foreign operators outside the regulatory framework.

- **4A** Establishing a joint Government-industry taskforce with steel founders and steel industry representatives to monitor and enforce legal compliance. The taskforce will involve relevant agencies including MHI, the Malaysian Investment Development Authority (MIDA), Commission (Industry Development Small Mediums (CIDR), the legal regulator, FELTA, the Royal Malaysian Customs Department, the Malaysian Anti-Corruption Commission, and so on, and in collaboration with industry associations supported by offshore stakeholders.
- **4B** Investigating and enforcing closure of unlicensed mills and facilities producing substandard materials from illegal sources from the unlicensed business bodies. MHI will collaborate with relevant agencies and local authorities to ensure that the use of substandard materials is reduced in the country, followed by industry-wide compliance safety.
- **4C** Extending compliance with MS norms and conditions including safe usage, operation and maintenance and export license, to enable more effective capacity management for the industry. Non-compliance will need to be addressed, including some substandard, in order to attract investment and growth of industry.

Strategy 5: Securing Domestic Raw Material Supply

A reliable and stable supply of raw materials is crucial to driving firm business and making the steel sector. There are ongoing issues with domestic scrap metal supply that must be addressed.

- **5A** Tightening enforcement against illegal scrap exports through inter-agency taskforce and review of export license and requirements. This will include a study area of scrap export reduction from Malaysia to allow more scrap metal within domestic use.
- **5B** Strengthening implementation and monitoring of Approved Domestic (ADP) for scrap exports to ensure compliance in using information and control over the volume of scrap being exported to other countries.
- **5C** Regularly reviewing scrap export policies to ensure alignment with domestic needs and global market dynamics. ADP limited supply globally, so finding demand for scrap is vital to our nation steel production, the Government will continuously monitor scrap and ensure Malaysia's scrap export needs and policies to align with domestic needs.

Strategy 6: Establishing Groundwork For Steel Sector Decarbonisation

For decarbonisation of the iron and steel industry, it is important to first define clear decarbonisation pathways, establish standards for decarbonisation and green steel, as well as set up financial incentives and support. Initial carbonisation and pathway for the Malaysian steel industry. At the same time, an industry specific timeline for decarbonisation must be set and aligned with the national government towards net zero by 2050.

- 6A Defining and clarifying a decarbonisation roadmap** – a green roadmap for the industry to iron and steel industry covering all the production, iron and steelmaking, expanded conversion and industries. This roadmap will outline decarbonisation opportunities across production technologies and product categories, capacity development, and product mix, providing a roadmap framework to align efforts and guide investments in new technologies such as H2, DRI, etc.
- 6B Institutional and implementing regulatory to measure, report and validate (MRV) GHG emissions for all steel mills in Malaysia** that will require a uniform standard of data entry, forming the foundation for carbon pricing and related mechanisms.
- 6C Establishing national standards for low-carbon and green steel** including a green house gas accounting framework, environmental product declarations (EPDs) and aligned incentives. EPDs will be mandatory for exported products to enable for comparison with other countries. Standards will be carbon based, voluntarily agreed, and allow for differentiated incentives for the complex, higher grade steel products.

Table 2.1
Technical decarbonisation pathways for Malaysia's iron and steel industry by technology route

Technology route	Pathway targeted
Direct Blast Furnace based process CO2 capture	Targeted by 2040-2045 only for low temperature applications (e.g. pig iron)
H2 Electric arc furnace	2030-2035 for high temperature steel, and 2040-2045 for low temperature steel
CC Electric arc furnace	2040-2045 for low temperature steel
MSR/MSR Iron, Electric arc furnace Steel Refining	2030-2035 for high temperature steel
Green steel Electric arc furnace	2040-2045 for low temperature steel

Box 6.1

Global green and standards

The Government encourages those industries which manufacture and export products and provide services with a competitive advantage of enhanced carbon saving and reduction. The following set of guiding principles will help them building, maintaining, enhancing and improving relations and standards in Malawi.

➤ **Alignment with international standards**

Industry standards are globally recognised benchmarks to improve the economic competitiveness and competitiveness of those who adopt them in the long and short term.

➤ **Resilient, open and transparent**

For markets to move from traditional trading to free, open and resilient, therefore, transparent and open markets is a global imperative.

➤ **Commitment to climate accountability**

Industry standards within the sector. Hence, if any firm or individual working in industry, who is not actively working to reduce emissions for the environment is a liability.

➤ **Reliability, technology and leadership**

Industry standards are a reflection of the state-of-the-art, including technology, innovation, progress and innovation, which has to be a result of work and innovation in the global market.

➤ **Independent verification and integrity**

Industry standards are a reflection of the state-of-the-art, including technology, innovation, progress and innovation, which has to be a result of work and innovation in the global market.

➤ **Increasing the sustainability**

Industry standards are a reflection of the state-of-the-art, including technology, innovation, progress and innovation, which has to be a result of work and innovation in the global market.

Strategy 7: Creating An Enabling Environment For Green Financing And Investments

An effective green environment and financing framework will enhance the industry's ability to attract green investments, giving priority to the green and sustainable investment opportunities and longer-term potential for water to capture value from low-carbon technologies. Effectively managing climate and water sector challenges will be important to attract these investments.

- **7A: Establishing a policy framework and financing for green financing for water covering** national and regional financing that is aligned with global standards and accessible to the steel sector. The framework will provide clear guidelines for financial, technical and operational support and provide incentives to the industry for sustainability. This will then be used to regulate the industry, integrate financial and technical green investment.
- **7B: Facilitating access to public funding at national, regional and global levels through** multilateral banks and investment funds. MSF will collaborate with the industry to facilitate access to funding with IFIs, multilateral development banks, and other or other financial capital for climate finance.
- **7C: Facilitating access to debt and capital markets.** Efforts will be made to facilitate private equity capital for green investment in order to ensure a range of financial resources that make green investment.

Strategy 3: Facilitating Strategic Collaboration And Demand Commitments For Downstream Sector

A rising and growing downstream steel sector are important to support national industrial development and to meet demand forecasts of priority sectors identified in the 2025 MTI. Recognising the importance of facilitating and supporting downstream steel companies to perform, support expansion and alignment with current sector

- **8A Encouraging strategic partnerships between downstream steel products and priority industries** defined in the NAB 2025 such as aerospace, automotive, construction and shipbuilding. These partnerships will support alignment of production capabilities with downstream demand and drive innovation.
- **8B Convening stakeholders and developing market intelligence** by establishing formal forums for priority sectors. These forums will provide insights into volume, product requirements, and delivery commitments to inform downstream production planning.
- **8C Supporting industry networks and innovation** by promoting cluster development between steel makers, research institutions and manufacturers. These clusters will accelerate research, innovation, adoption of new technologies.
- **8D Constituting a task force or market study** to identify opportunities for high value-added steel, including green products, and export expansion for the downstream industry. This study will be conducted in close collaboration with relevant partners and stakeholders.
- **8E Facilitating investments into high value added downstream segments** by providing priority to steel companies based in Malaysia, followed by local and foreign joint ventures, then foreign investments. With a view to increasing production of high value added steel products, including for local and regional automotive (OEM) and non-automotive (NTO) applications, apart from others.

Strategy 3: Promoting Effective Sector Governance

The industry's current and market dynamics have materially shifted in the past several years, as it has undergone converging changes to overall industry development and co-operation needs towards the new paradigm where digital, environmental and emerging technologies of the sector are expected to provide efficiency, effectiveness and for progress in the production process for the industry.

- **9A Enhancing the Malaysia Steel Consortium's role** as an effective communication network and market management, inputs to regulatory, export standards and sector development. The structure of the consortium will be revised to meet its goals and align with emerging policies and global benchmarking implementations. The Consortium will be mandated to ensure transparency of operations, standards and industry of open for implementation, and will facilitate between local stakeholders on industry initiatives.
- **9B Reviewing and renewing the Malaysia Steel Institute's mandate, governance and funding model** to better respond to industry needs. The operating model and governance of MTI will shift to align with the new industry context, with a clear role in supporting policy implementation for the new and steel industry.
- **9C Encouraging a single coordinated voice for the steel industry** to promote industry merger and collaboration in the marketplace. A united platform for all industry players will strengthen industry and facilitate aligned responses to external issues.
- **9D Building a talent pipeline for the green steel transition** by developing skill gaps and workforce that supports skills to advance into the green steel transition that may be subject to capacity, demand, as well as quality and cost gaps. In specific jobs, industry will invest in engineering needs in digital and sustainability to ensure education and training enables transformative technologies and new jobs. Training and development can be achieved or improved in skill and career path through a dual system, partnerships and other learning schemes.

MEDIUM-TERM STRATEGIES (2025-2030)

Strategy 10: Providing Regional Leadership In Industrial Decarbonisation

Industry is well positioned to play a leading role in advancing regional efforts toward a low-carbon future. There is an important opportunity for AISCMI to provide solutions to shared challenges in the iron and steel industry, including addressing regional steel capacity, facilitating innovation in steel and strengthening of export markets.

- **ITA Establishing common regional frameworks and standards** by developing regionally aligned approaches for emissions, reporting, environmental (EHS), and economic (E) impact assessment (EITA) related to steel enterprises and supply networks for goods steel including manufacturing of value-added goods.
- **ITA Defining a common AISCMI approach to managing emissions** through coordinated action across member states, while facilitating regional collaboration on expansion of key markets essential for steel production and steel-based infrastructure.
- **ITA Enabling regional infrastructure connectivity for decarbonisation** by supporting the development of an integrated ASEAN value chain for hydrogen production, renewable energy generation, and carbon capture, utilisation, and storage (CCUS).

Strategy 11: Accelerating Implementation Of Carbon Mechanisms For The Industry

Carbon mechanisms will help drive the steel industry by establishing a level playing field and enabling appropriate cost recognition for high-carbon production efforts. This early implementation is essential for decarbonising emerging markets from Asia and other major markets.

The Government will target a peak in total emissions around by 2025 for the Malaysian steel sector. The immediate action plan to achieve this includes: (i) accelerating the implementation of the carbon pricing mechanism, (ii) accelerating the implementation of the carbon trading mechanism, (iii) accelerating the implementation of the carbon tax, and (iv) accelerating the implementation of the carbon market.

- **ITA Advancing strategy on a Carbon Border Adjustment Mechanism (CBAM)** in tandem with carbon pricing to ensure carbon leakage around import/export of high-carbon steel into Malaysia. Efforts to support implementation of the CBAM include: (i) working with the Ministry of Natural Resources and Environmental Sustainability (NRES) to support measures leading to CBAM, with corresponding carbon pricing mechanisms introduced for domestic producers.
- **ITA Implementing carbon pricing instruments through a phased approach** to allow the steel industry time to adjust to the requirements, by setting the existing conditions in place and allowing it a smooth transition. The Government will consider starting with a short carbon tax or emissions from the iron and steel industry by 2025, then consider introducing carbon market such as cap and trade, emissions trading system (ETS) or cap and trade.

Strategy D: Implementing Comprehensive Low Carbon Or Green Steel Policy Frameworks And Enabling Infrastructure

The overall low carbon path for the steel industry needs to be backed up by government-led low carbon and green steel standards, device and incentive for production, financing, research and development, infrastructure, renewable energy and raw material supply.

- 104 **Setting investments and accelerating development of green infrastructure** including low carbon products, renewable energy generation, and CCUs hubs. These should be responsible for industrial decarbonisation and are nation's priorities under long-term energy and industrial planning. The development of the electricity grid and the network of pipelines towards 70% renewables being generated by 2030 are critical aspects, closely aligned to the green transition of the steel industry.
- 105 **Stimulating demand for low carbon and green steel** through public sector procurement policies, reinforced by "Buy Made in Europe" and "Buy Low-Carbon Europe" policies, and government processes and awards. The public sector and civil will be encouraged to lead the way in procuring steel products from lowest carbon production technologies, followed by the private sector and other commercial actors.
- 106 **Increasing early adoption of low-carbon materials in the private sector** by providing incentives such as being carbon and climate fit for sustainability and green steel products that comply with the needs of the private industry, which green steel standards will be developed and adopted.
- 107 **Ensuring long-term supply of inputs for green steel production** by supporting the development of CCUs hubs, private investments for high-grade hydrogen gases, efficiency, and waste-to-energy, metal collection, sorting and recycling systems. These inputs will be essential to enabling hydrogen-based and EAF-based steel production routes.

Strategy E: Reinventing in Industry Capabilities And New Technologies

Improving the economic and environmental competitiveness of the steel industry is inherently a collective effort, which public can facilitate industry development. There are several key areas identified for industry players to enhance innovation in commercial and operational improvements, as well as energy efficiency and decarbonisation factors.

- 11A **Exploring a Carbon Competitiveness Fund for investment in industry transformation** and digitalisation supporting energy efficiency, industry 4.0 upgrade, digital transformation, and green steel innovation projects across the steel industry, until when in Horizon 2021 will expire, linking this fund with resources from EDPF, under the leadership of the steel industry and its stakeholders.
- 11B **Encouraging operational, commercial and environmental excellence across the domestic industry** with low-carbon companies leading a digital improvement and capacity building and new technology initiative.
 - Driving cost efficiency with implementation of digital transformation
 - Encouraging innovative capabilities with research, innovation management and leadership of product portfolio
 - Partnering with customers with digital services and other strategic alliance agreements, and to develop the sustainable commitments
 - Improving energy efficiency in internal operations
 - Streamlining data management plans involving different commercial and digital data
 - Improving supply management and logistics operations for fully integrated plant
 - Securing commitments to strengthen sustainable supply chain
 - Encouraging distributed innovation ecosystem that allowed for alternative pathways, technology data and capital sharing

LONG-TERM STRATEGIES (Beyond 2030)

Strategy 14: Completing The Green Transition
Of The Steel Industry By 2050

Beyond 2030, MTS will continue to proactively and pro-innovatively sustain its own and steel industry programmes which is underpinned by a robust green transition. This will be essential towards Malaysia's national commitment to reach net-zero carbon emissions by 2050.

- **14A** Phasing out high-carbon steel production and achieving net-zero by shifting away from BF-BOF technologies and adopting HD-DRI-EAF to drive more green steel production pathways. Malaysia will create economic value in its manufacturing sector by
- **14B** Scaling up green infrastructure projects for the steel industry, including national hydrogen hubs, expanded renewable energy grids, CCS, and sustainable resource and supply network to supply of green-steel and finished products.
- **14C** Positioning Malaysia as a regional and global leader in green and high-value steel exports to expand its production and reach to 40+ green supply chain and global markets to meet international sustainability standards and market demand.
- **14D** Continuing to strengthen comprehensive and adaptive green policy framework aligned with sustainability benchmarks, steel sector's own carbon account and standards, and ensuring full alignment to a robust regulatory system and being more cost-effective.

Strategy 15: Mobilising Talent And Capital For
The Steel Sector Of The Future

The green transition of the steel sector will depend on seeking significant financing and talent resources. The green transition to steel manufacturing requires a market, innovation, growing of skills and investment in human capital across the sector and chain.

- **15A** Mobilising and deploying blended finance and resources capital at scale from both public and private sources, including multilateral institutions and climate funds, to support large-scale investments in low-carbon steel production and infrastructure.
- **15B** Creating next-generation talent and technical capabilities to develop, achieve and sustain a new paradigm of digital sustainability and green engineering skills, supported by continuous upskilling, MBO partnerships and industry-academia collaboration.
- **15C** Driving technological leadership in steel manufacturing and operations through full adoption of smart manufacturing, advanced material, energy and emissions engineering, and process and digitalisation of production and manufacturing.

CHAPTER 06

IMPLEMENTATION AND GOVERNANCE

Effective governance and disciplined implementation are central to delivering the aspirations of this Roadmap. As Malaysia's iron and steel industry enters a period of transition, MFI recognises that policy execution must be strengthened to match the scale and urgency of change required. This includes realigning institutional roles, reinforcing accountability, and enhancing cross-agency coordination. A modernised governance framework will ensure decisions are timely, enforcement is effective, and implementation is disciplined. By embedding these principles across the system, the Government aims to build a more agile and outcomes-driven institutional architecture to support the industry's long-term transformation.



Enhanced Industry Governance

The development of the Malaysian Iron and Steel Industry has guided by outside, donor initiatives by the Ministry of Industries, Trade and Enterprise (MIT) supported by organisations such as the Malaysia Steel Council (MSC), the Malaysia Steel Institute (MSI) as well as the Malaysian Ironmakers Development Authority (MIDA) and Commission Industry Development Board (CIDB).

With these institutions have provided a supportive for development, the industry has fundamentally shifted. Being decentralised, imperative, sector of competitiveness, openness and it emerging market industry require a stronger, more agile governance model that is transparent, policies and results.

MSI is dedicated to realising industrial vision, strengthening governance and playing implementation mechanisms across industries and agencies across the country and all of the Roadmap.

Strengthening governance structures for the steel sector

The Iron and Steel Industry is governed by MSI, which provides overall policy leadership. The MSC, established in 2011, serves as a platform for policy alignment, engagement and oversight. It is supported by MIDA, CIDB and a range of financial institutions and stakeholders.

MSI recognises that the governance architecture must evolve to meet new demands. The MSC will be restructured to function as a robust policy decision platform focused on strategic goals.

- Deepening engagement initiatives
- Increasing transparency and performance measures
- Improving institutional governance
- Securing raw material supply
- Ensuring skilled quality and standards and
- Accelerating industry digitalisation

The MSC will shift from a policy coordination body to one with a clearer role in implementation monitoring and agency accountability. Working agencies will be defined as the all parties with a shared feeling of ownership and integration. Resources and participation will be assessed to ensure the industry remains relevant and industry and key stakeholders are effectively represented.

Redefining role and scope of the Malaysia Steel Institute

MSI was originally established as an entity to support industry development by delivering capabilities and meeting critical industry gaps, including through capacity, providing a framework, recommendations or stage responses and policies to support industry of the Roadmap. MSI will clearly and sharpen into mission as a policy implementation support agency. Its core responsibilities will include:

- Managing and creating development through standards and weights
- Supporting policy evolution through sector insights and performance
- Address challenges facing industry employment
- Supporting industry readiness building based on industry demand

The regular meeting with government and industry structure MSI will ensure highlighted development, where and ensure industry leads and independence. It more robust and evidence-based model will be assessed, reducing the potential introduction of a new institution industry production and exports.

Improving coordination and execution across agencies

Effective policy requires in the steel sector requires coordination across MSI. The Government will strengthen inter-agency execution mechanisms to ensure alignment with the Roadmap. This includes harmonising data accountability framework between MSI, MIDA, CIDB and agencies such as the CIDB and High Malaysia Economic Development.

Agencies will have designated leads and coordinate pathways for collaboration, with mechanisms for regular alignment and issue resolution. Regulatory activities will also be assessed where necessary to support efficient implementation.

Enhancing transparency, data access and industry engagement

SRF will improve data transparency and engagement with stakeholders to enable a more collaborative and open-source information landscape. Priority actions include:

- Improving a data sharing and confidentiality framework to ensure access for critical access to industry market and regulatory data.
- Improving consultation and feedback in technological or regulatory changes and policy development.
- Improving greater clarity on policy reforms and programmes for the more open and transparent in business, trade, supply chains and investments.

SRF will be tasked with producing annual statistical analysis on industry performance, market trends and policy implementation status to facilitate informed participation by stakeholders.

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Driving disciplined implementation of the Roadmap

This Roadmap defines a wide range of actions for the short and long term to realise the vision for the Singaporean digital economy, but not a complete execution and implementation plan.

SRF is developing:

- Detailed 3-year industrial roadmap.
- Planning, review, resource and implementation across POP/TPPs.
- Ensuring consistent engagement and partnership with industry stakeholders.
- Monitoring and reviewing policy outcomes and
- Taking corrective actions when needed to stay on track.

With these measures, SRF will set a new benchmark for sector governance and continuous effectiveness, enabling the two and three sectors to deliver on economic, environmental and national development objectives.



CHAPTER 07

CONCLUSION

Malaysia's iron and steel industry stands at a pivotal juncture. Without decisive policy interventions and industry action, the sector risks long-term economic unsustainability and will fall short of contributing meaningfully to the nation's net zero ambitions. The time for action is now. Achieving the vision of a resilient, low-carbon, and high-value steel sector will require bold and coordinated efforts from all stakeholders across Government, industry and finance. The Roadmap outlines a clear and actionable path forward. Actions are required to address immediate challenges across the entire value chain, from raw materials and upstream mills to midstream and downstream segments.

The global and regional outlook for steel remains uncertain. Malaysia must respond with urgency and ambition to secure competitiveness and regional leadership. This includes building a comprehensive green industrial ecosystem, expanding green infrastructure, strengthening technological capabilities and positioning the country as a hub for value-added and low-emission steel products. Transforming the steel sector is both a national economic necessity and a climate responsibility. Delivering this transformation demands more than policies and strategies; it requires conviction, boldness and a genuine sense of urgency. Moving with speed and clarity is not just about reacting to risks, but about positioning to lead. Malaysia must act now to secure a sustainable and competitive future for its steel industry.





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