Climate Catalyst

November 2025

Indonesia Steel Decarbonisation Report: Defining low-carbon steel and the global steel demand

About Climate Catalyst

Climate Catalyst strengthens collaboration and mobilises new actors on pivotal climate challenges.

We work behind the scenes with diverse stakeholders in Europe and Asia to identify opportunities where action to date has been limited, the potential for collaboration is high, and there's significant potential to reduce greenhouse gas emissions. We then bring together renowned experts and new entrants to deliver creative campaigns that build power and secure decisive action by governments and the private sector to ensure we reach our vision of a just, prosperous world in which global temperature rise is limited to 1.5°C.

To date, we've sparked collective action in support of peatlands protection in Europe and to secure positive shifts towards steel decarbonisation in India and aviation in Europe. We developed a new programme on heavy industry which has now launched in Indonesia.

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Executive Summary

Indonesia's ambition for 8 per cent economic growth by 2029 is being tested by a global market that increasingly demands low-carbon products, such as steel. Indonesia's steel sector is a major global player, demonstrating resilience and rapid growth. According to the World Steel Association, Indonesia ranked as the fifteenth-largest steel producer globally in 2023 and saw its crude steel production surge of approximately 16.8 million tonnes. This firmly establishes Indonesia as a critical node in regional supply chains.

Consequently, despite low current exports to the EU (3.8 per cent of total steel exports), the sector is critically vulnerable to policies like the Carbon Border Adjustment Mechanism (CBAM), signaling severe future vulnerability if global carbon regulations broaden. CBAM is a trade and climate policy tool that adds a carbon price to certain imported goods, including steel to ensure that companies outside the EU face similar carbon costs as those within the region of the EU Emissions Trading System (ETS).This pressure, however, provides a critical opportunity: a well-managed transition, backed by strategic policy, can unlock job creation and enhanced global competitiveness.

The underlying challenge is the fragmented global definition of low-carbon steel. Although carbon intensity is the core metric, certification standards are locked in conflict: Indonesia's high-carbon intensity (1.6 tCO_2e/ton products) is exposed to this debate. The national decarbonisation strategy must prioritise rewarding absolute reduction in carbon intensity over scrap share, ensuring investments in the blast furnace - basic oxygen furnace (BF-BOF) efficiency and green hydrogen-direct reduction iron (H-DRI) capacity building are economically viable.

This report examines the alignment between the Indonesia Green Industry Standard (SIH) with three prominent international standards—ResponsibleSteel, the Global Steel Climate Council's (GSCC) Steel Climate Standard, and the Low Emission Steel Standard (LESS).

Key findings:

- Despite low current exports to the EU, the sector is exposed to future vulnerability if global carbon regulations broaden. With an average carbon intensity of **1.6 tCO_2e/ton**, Indonesia is critically exposed to the fragmented global debate on low-carbon steel standards.
- It was found that SIH needs upgrading to mandate mandatory third-party verification, explicit Scope 3 emission accounting, and product-level carbon intensity tracking. This ensures Indonesian steel exports can credibly comply with CBAM and compete fairly in tightening global markets under process-agnostic definitions.
- Across developed economies, CBAM-related discussions are increasingly shaping industrial and trade policy directions. In regions like Southeast Asia, where BF–BOF remains dominant, the CBAM is triggering discussions around shifting to EAF or DRI technologies.
- Indonesia must substantially strengthen and enforce its green public procurement (GPP) framework to bridge the domestic capacity for green steel with its crucial export ambitions, ensuring that local investments are protected and scaled before fully facing the competitive pressures of global markets like the EU CBAM

To capture this market opportunity, Indonesia must strategically align its policies and technologies. Crucially, the government must substantially strengthen and enforce the green steel standards and create a market through the GPP framework for instance, to establish a guaranteed domestic buyer of early-stage low-carbon steel. This strategic demand signal is vital to de-risk the high capital expenditure for breakthrough low-carbon technology such as hydrogen facilities, which are essential for long-term export viability. Therefore, to remain competitive, Indonesia's transition requires decisive investment in low-carbon technologies, prioritising the scaling of electric arc furnaces (EAF) and the strategic, long-term embrace of hydrogen-based Direct Reduced Iron (DRI). By acting decisively to align policy and technology, Indonesia can strategically navigate global carbon pressures and secure a leading, sustainable position in the future steel economy.

Chapter 1: Low-Carbon Steel Definition and Standards

1.1 Defining low-carbon steel

Low-carbon steel refers to steel produced with significantly lower greenhouse gas emissions compared to traditional methods. While a fixed global standard is still developing, the definition increasingly revolves around carbon intensity of the steel production process, measured in tons of CO_2 equivalent per ton of steel produced.

Table 1.1. Evolving classifications and thresholds

High-Carbon Steel

Global Average (BF-BOF route)

~1.8–2.2 tCO_2 per tonne of crude steel produced

Based on traditional Blast Furnace–Basic Oxygen Furnace (BF-BOF) methods, which rely on coal. Most common method globally.

Low-Emission Steel

Varies by standard:

IEA Net Zero Targets

- 0.9 tCO_2/t (by 2040)
- 0.2 tCO_2/t (secondary steel, by 2040)

Sliding scale: More scrap input resulted in a lower emission threshold.

ResponsibleSteel + LESS

- 0.05–0.4 tCO_2/t (depending on scrap input)

Emission intensity targets to reach climate goals. Differentiated by primary vs secondary production.

Near-Zero Steel

Varies by standard:

IEA (Net Zero by 2050)

- < 0.1 tCO_2/t crude steel by 2050 (primary)
- < 0.1–0.2 tCO_2/t (secondary by 2040–2050)

Indicates deep decarbonisation through hydrogen DRI, CCS, or full electrification.

ResponsibleSteel + LESS

- Below 0.05–0.1 tCO_2/t

Generally accepted as approaching "near-zero" emissions. Dependent on renewable energy, green hydrogen, or maximum scrap use.

Despite this core consensus, a significant challenge remains: there is not yet a universal or agreed-upon definition or classification for low-carbon steel (as illustrated in Table 1.1). This absence creates substantial hurdles for market transparency, investment, and effective policy-making. The application of the carbon intensity metric is highly fragmented due to methodological differences across initiatives. These inconsistencies primarily stem from two areas: variations in scope and boundaries, where stakeholders disagree on defining the full system limits and the proper allocation of emissions (Scopes 1, 2, and 3). Moreover, there is an inconsistent terminology, where terms such as "green steel," "low-emissions steel," and "near-zero emissions steel" confuse the market. The immediate imperative is to unify the underlying methodology to ensure that current and future decarbonisation efforts are truly comparable and credible.

For Indonesia, according to the Indonesia Industrial Decarbonisation Roadmap, the emission intensity of Indonesian steel is at 1.61 ton CO_2e/ton products[1]. This carbon intensity level reflects the dominance of conventional BF-BOF technology. This intensity is considered as high-carbon steel according to the emerging global low-carbon steel benchmarks and therefore highlights the gap the Indonesian steel industry must close.

Table 1.2. Carbon emission intensity and energy consumption of steelmaking processes

Process technology	Direct emission	Direct and indirect emission	Energy Consumption (GJ/t)		Share of global steel production (%)	Notes	Source
	(ton of CO_2 /ton of crude steel)		Lower Range	Higher Range			
BF-BOF	1.2	2.33	21.4	23.98	73.2	The majority of current steel production uses coal to reduce iron ore and produce steel in the integrated steelworks	IEA (2020), World Steel Association (2023)
DRI-EAF (Natural Gas)	1	1.37	17.1	22.37	4.8	This route may use natural gas to reduce iron ore which can halve the emission	IEA (2020), World Steel Association (2023)
Hydrogen DRI-EAF	~0	0.2-0.4	26	30	<1 (pilot stage)	Uses renewable hydrogen for reduction and green electricity; potential for near-zero emissions	IEA (2021), Agora Industry (2021), ETC (2022)
Scrap-EAF	0.04	0.68	0.04	10.20	21.5	Secondary steel uses electricity to melt steel scrap and/or direct iron with smaller on-site emission	IEA (2020)

1 Decarbonization Roadmap 9 National Industrial Sub- Sectors

As shown in Table 1.2, the calculation of these emissions requires a comprehensive approach. The International Energy Agency (IEA) emphasizes the necessity of clearly defining the boundaries for all calculations, including Scope 1 (direct emissions), Scope 2 (indirect emissions from purchased energy), and Scope 3 (all other indirect emissions). A true understanding of low-carbon steel, therefore, requires considering GHG emissions across the entire steel value chain, not just those directly emitted during the steelmaking process itself.

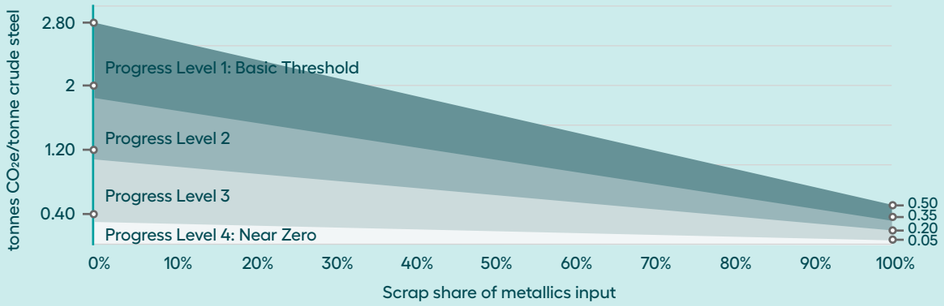
One of the immediate pathways to achieve the lower emission steel lies in the increased utilisation of scrap within steel production (Scrap-EAF). This is because scrap-based steelmaking directly influences both Scope 1 and Scope 2 emissions through lower energy requirements, and indirectly affects Scope 3 emissions by reducing dependence on carbon-intensive raw materials like iron ore and coking coal.

Scrap steel utilisation and its emission

Emissions associated with scrap utilisation primarily stem from the electricity required to melt scrap in EAFs and, to a lesser degree, from impurities in the feedstock. Producing steel from scrap generates substantially lower emissions than producing new steel from iron ore. Consequently, the carbon footprint of recycled steel is highly dependent on the electricity grid where the greener the power source, the lower the resulting emissions.

Sliding scale framework defines graduated progress levels by factoring in both the proportion of scrap used and broader low-carbon transition measures. This framework aims for a nuanced assessment by defining graduated progress levels that factor in the proportion of scrap used alongside advancements like renewable electricity adoption or breakthrough technologies. This approach is intended to provide equitable and comparable benchmarking across both scrap-based and primary steelmakers, ensuring all pathways are rewarded for continuous improvement toward a low-carbon transition.

Figure 1. Sliding scale scenario for scrap steel



Source: ResponsibleSteel, 2022

However, the sliding scale mechanism faces a significant lack of universal adoption because of global disparities in scrap availability. Since the worldwide supply of high-quality scrap is finite, many countries with large primary steel markets and growing demand find that a high-scrap benchmark is simply not feasible to meet production volumes. Furthermore, this approach is often perceived as inequitable by major primary producers (relying on BF-BOF or new DRI), as a system that heavily rewards a resource they lack penalises their substantial investments in breakthrough technologies like carbon capture or hydrogen, thus leading these nations to prefer standards that measure process emission intensity independent of raw material source.

This constraint relates to the condition for Indonesia whose steel sector is dominated by primary production (BF-BOF) with low domestic scrap availability. Consequently, Indonesia's strategy must focus on improving BF-BOF efficiency and building capacity for green hydrogen-DRI, rather than adopting a definition heavily dependent on globally limited scrap. Advancing demand creating mechanisms such as green public procurement will be essential to de-risk the high capital expenditure required for early-stage green hydrogen/DRI transition facilities.

Given the complex and evolving nature of these definitions and the various pathways to emissions reduction, it becomes clear that a unified global understanding of low-carbon steel is important for effective climate action and fair market competition. Therefore, the subsequent section will delve into key international standards for low-carbon steel, examining how organizations like ResponsibleSteel and the Global Steel Climate Council (GSCC) attempt to provide the clarity and accountability that the evolving definitions of low-carbon steel demand.

1.2 International Standards for Low-Carbon Steel and Indonesian Green Industry Standard for Steel

For steel producers, compliance with international standards is increasingly necessary. These frameworks serve multiple purposes: they guide industry efforts towards tangible emissions reductions, foster transparency and comparability in a complex market, and enhance the competitiveness of producers committed to sustainability.

This section critically analyses three prominent international standards—**ResponsibleSteel, the Global Steel Climate Council's (GSCC) Steel Climate Standard, and the Low Emission Steel Standard (LESS)**—examining their core criteria, strategic impacts, and the distinct advantages and challenges their varying approaches to emissions accounting, verification, and overall scope present for the steel sector.

Table 1.3. International standards for low-carbon steel

Name of standard	Type of standard/ compliance	Consideration (Scope & criteria)	Threshold (Baseline & emission limits)	Who uses it
Responsible Steel	A voluntary, international, multi-stakeholder certification focused on Environmental, Social and Governance (ESG) principles and sustainability across the steel value chain	Broad ESG and climate standard covering 13 principles (emissions, labour, human rights, water, waste, biodiversity). Requires third-party audits.	Numeric thresholds exist via Progress Levels under Principle 10, which are scrap-variable and tied to decarbonisation levels (Level 4 = near-zero). No single universal threshold for all producers.	150+ members worldwide; steel producers and buyers in Europe, Asia, North America, South America, Oceania.
GSCC	A technical certification standard closely aligned with EU ETS and CBAM requirements, emphasising product-level carbon intensity and emissions traceability	Carbon-specific, technology-agnostic standard. Focus on Scope 1–3 GHG accounting, science-based targets, and verified product or enterprise certification.	Benchmarks aligned with the IEA 1.5°C pathway. Example: <1.0 tCO_2/t hot-rolled steel by 2030, tightening toward near-zero by 2050.	Members in 79 countries, especially North America and Europe.
LESS	A product-based standard that assigns clear carbon performance labels, helping buyers to identify low-carbon steel	EU-led standard, product-level and cradle-to-gate. Includes Scope 1, 2, and selected Scope 3. Mandatory third-party verification and product classification.	"Near-zero" benchmark plus Classes A–E, with thresholds adjusted by scrap share (sliding scale).	Primarily EU-based producers (e.g., Germany, Belgium, Netherlands). Increasingly relevant for EU export market access.

Indonesia Green Industry Standard (SIH - Standar Industri Hijau)

The Ministry of Industry established the Indonesian Green Industry Standard (SIH) as a policy framework to promote sustainable practices across the nation's industrial sectors. While SIH applies broadly, it includes sector-specific regulations tailored to each industry. Ministry of Industry Regulation (Peraturan Menteri Perindustrian/Permenperin) No. 45 of 2024 specifically targets the sheet steel industry, for companies producing steel slab, plate, hot rolled coil (HRC), and cold rolled coil (CRC), but does not yet include crude steel. The compliance of SIH is currently voluntary but the government plans to make it mandatory in the near future. The broader goal of the SIH framework is to regulate industries that have high energy consumption and rely heavily on non-renewable raw materials, ensuring their transition toward more sustainable and efficient operations.

The SIH for flat-rolled steel sets out both stringent technical and necessary management requirements for the sector. The nine technical aspects mandate performance across crucial areas, including raw materials, auxiliary materials, energy, water, the production process, product standards, packaging, waste management, and GHG emissions. These technical requirements are underpinned by six management aspects that ensure proper implementation and governance, covering policy and organization, strategic planning, implementation and monitoring, internal audit and management review, corporate social responsibility, and manpower/labor management.

Alignment of SIH technical requirements with international standards

ResponsibleSteel

Compliance with ResponsibleSteel brings key benefits: it demonstrates a full ESG commitment, making companies more transparent and their supply chains easier to trace. It also helps them stand out to customers and investors who value broad sustainability, while reducing operational and reputational risks.

ResponsibleSteel is the only framework among the three that integrates non-emission aspects such as labour conditions, human rights, and broader ESG factors into its certification scope. ResponsibleSteel is designed as a comprehensive ESG certification framework for the steel value chain. These include commitments to occupational health and safety, fair labour practices, human rights protection, stakeholder and community engagement, and the responsible management of water, waste, and biodiversity. Climate change and GHG emissions form only one part of its broader sustainability framework (Principle 10). Certification under ResponsibleSteel requires independent third-party audits and stakeholder consultation, ensuring that both social and environmental dimensions are addressed in a verifiable manner.

With a membership of over 150 entities, ResponsibleSteel's certified production volume of 132 Mt signifies its growing influence in establishing a global benchmark for responsible steel practices. ResponsibleSteel could serve as a foundational standard to build robust ESG management systems and address a broad range of sustainability concerns, appealing to a wide array of stakeholders.

Table 1.4. Alignment between SIH and ResponsibleSteel

ResponsibleSteel Key Components	SIH components	Alignment status	Notes
RS Principle 1: Corporate Leadership – sites must be led responsibly, with accountability and integrity	SIH includes management requirements categories: policy & organisation in management requirements		SIH provides management requirements. However, in disclosure, RS may require more explicit stakeholder-governance details.
RS Principle 2: Social, Environmental & Governance Management Systems – effective systems to manage ESG risks and impacts.	SIH mandates technical + management requirements for the flat-rolled steel sector.		SIH has good alignment with RS on the existence of management systems and verification.
RS Principle 3: Responsible Sourcing – sourcing of raw materials and inputs from suppliers with ESG performance.	SIH covers raw materials, auxiliary materials under technical requirements		SIH addresses raw materials and auxiliary materials efficiency, but may not explicitly require supplier ESG performance or chain-of-custody as RS does.
RS Principle 5: Occupational Health & Safety – protection of workers' health and safety	SIH covers employment and labour management in accordance to Indonesian employment law		SIH includes labour/employment but RS tends to specify extensive OH&S requirements and monitoring.
RS Principle 6: Labour Rights – respect of worker rights, non-discrimination, freedom of association	Under management section, SIH has labour management in a high level manner		SIH acknowledges labour/employment needs such as training and OHS but does not yet cover the full breadth of labour rights required by RS pertaining to discrimination aspects.
RS Principle 7 & 8: Human Rights, Stakeholder Engagement – recognising human rights obligations and engaging communities.	SIH mentions CSR and responsibility social company under management requirements.		SIH includes social responsibility but has not explicitly defined full human rights/engagement frameworks as RS.
RS Principle 12: Water Stewardship; Principle 9: Biodiversity & Ecosystems – managing water use and biodiversity impacts.	SIH includes water under technical requirements and general resource efficiency		Good alignment on water stewardship. However, biodiversity coverage in SIH appears less explicit than RS.
RS Principle 10: Climate Change & GHG Emissions – reduction targets, energy efficiency, decarbonisation.	SIH specifically for flat-rolled steel: covers energy, emissions, resource efficiency		Good alignment on energy/emissions. Depth of decarbonisation pathways may differ.
RS covers waste/emissions via principle on waste & effluents	SIH includes waste management, recycling, production process optimisation.		SIH has a good alignment with RS for waste/recycling.
RS Principle 4: Decommissioning and Closure – planning for closure impacts.	Not clearly visible in the SIH summary publicly reviewed.		SIH does not explicitly reference decommissioning/ closure in the publicly available summary.
RS does not explicitly separate packaging; it may fall under waste/emissions.	SIH includes packaging under its technical requirement		Good addition in SIH but RS may not specify packaging separately.
RS requires third-party audits, certification, performance levels.	SIH defines technical and management requirements and verification methods		Alignment on verification/audit structure.
RS includes broad CSR via multiple principles (governance, human rights, labour).	SIH includes some CSR principles		SIH covers CSR but RS has more detailed requirements across labour/human rights/stakeholder.

(Legend: Green = strong alignment, Orange = partial alignment, Red = not aligned)

Indonesia's SIH has strong alignment in the technical, energy/emissions, and management system requirements with the ResponsibleSteel International Production Standard. However, the SIH is only partially aligned with the more advanced areas, such as detailed corporate social responsibility, supplier-sourcing, human rights, stakeholder engagement, and closure/decommissioning issues. A steel producer in Indonesia achieving SIH compliance gains a solid foundation for ResponsibleSteel certification, particularly in technical and management elements, but would likely need to implement additional measures to bridge the gaps shown above.

Significance of ResponsibleSteel standard for Indonesia

Advantages for the Indonesian Steel Industry

Adopting ResponsibleSteel offers significant advantages for the Indonesian steel industry by signaling a broad commitment to holistic sustainability that extends beyond just carbon emissions. This approach would appeal to a growing segment of international buyers, investors, and financiers who increasingly scrutinise overall ESG performance. Certification can differentiate Indonesian steel in global markets where consumers and businesses prioritize ethically and sustainably sourced materials, potentially opening up new market opportunities.

ResponsibleSteel's comprehensive criteria supports robust risk management which can help Indonesian companies identify and mitigate a wider range of operational, reputational, and social risks, which is crucial for maintaining global market access. The standard's structured framework, allows for different levels of achievement, and enables Indonesian companies to progressively improve their ESG performance and gain certification at various stages of their sustainability journey. Ultimately, demonstrating strong ESG credentials through ResponsibleSteel certification can make Indonesian steel companies more attractive to international investors focused on sustainable and responsible businesses.

Potential Challenges for the Indonesian Steel Industry

Despite the benefits, Indonesian steel companies may face certain challenges in adopting the ResponsibleSteel standard This would include the complexity and cost associated with implementing the full suite of 13 principles. This can be particularly demanding for small to medium-sized enterprises (SMEs) within the sector, which may lack mature ESG management systems or the resources for extensive changes. Additionally, the requirement for comprehensive ESG reporting necessitates robust data collection and verification mechanisms across numerous operational areas. Establishing these systems might be challenging and resource-intensive for some companies, especially in the initial stages of adoption.

Global Steel Climate Council's (GSCC)

The GSCC Steel Climate Standard offers to promote a robust carbon reduction by focusing on a comprehensive emissions boundary and ambitious, science-based targets. Its technology-agnostic approach aims to create a level playing field, measuring all steel producers against the same rigorous criteria regardless of their production methods.

Furthermore, by requiring verified carbon emissions data and clear product labeling, the GSCC standard increases transparency for buyers, empowering them to make informed procurement decisions and stimulating demand for lower-carbon steel. The GSCC's broad membership, which includes manufacturers, associations, and supply chain organizations in 79 countries, particularly in North America and Europe, highlights its global ambition to standardize carbon accounting and reduction practices across the steel sector.

Table 1.5. Alignment between SIH and GSCC

GSCC Requirements	SIH Provisions	Alignment status	Notes
Clear boundary covering Scope 1/2/3 from raw materials to hot rolling	SIH technical requirements cover raw materials, auxiliary materials, energy, water, production process, emissions (GHG) among others.		SIH covers many of the process steps; however GSCC's emphasis on upstream Scope 3 and mining may require further detail in SIH.
Numeric carbon intensity benchmarks for steel products	SIH sets technical/ management requirements but does not appear to publicly specify numeric GHG intensity thresholds aligned to global standards.		SIH covers carbon emissions but lacks explicit product-level intensity targets matching GSCC's glidepath.
Third-party verification and product certification	SIH includes verification methods for technical requirements under management requirements.		Good alignment though GSCC's certification of product and science-based targets may demand higher rigour.
Technology-neutral approach (BF-BOF, EAF, scrap; any route)	SIH applies to the flat-rolled steel sector in Indonesia – but its focus is on the sector, not necessarily route-agnostic at the product-level.		SIH is sector-specific, GSCC is globally route-agnostic; SIH may need to ensure route neutrality for full alignment.
Science-based emissions targets aligned to 1.5 °C pathway	SIH includes strategic planning and management but does not explicitly commit to science-based targets aligned to 1.5 °C.		This is a significant gap: SIH does not appear to mandate a glide-path consistent with GSCC's.

(Legend: Green = strong alignment, Orange = partial alignment, Red = not aligned)

SIH aligns in many structural and management-process dimensions with GSCC's standard (especially verification and technical coverage of inputs/emissions). The main gaps are around numeric intensity benchmarks, science-based target setting aligned to a global 1.5 °C pathway, and full upstream Scope 3 coverage and route neutrality. For Indonesian producers to fully meet GSCC standard via SIH, they would likely need to adopt additional commitments such as explicit carbon intensity targets, route-agnostic definitions, and full upstream Scope 3 reporting.

Significance of GSCC standard for Indonesia

Advantages for the Indonesian Steel Industry

For the Indonesian steel industry, adopting the GSCC standard offers several key advantages. Its strong emphasis on measurable carbon reduction directly addresses critical issues like the EU's CBAM, providing a clear framework for Indonesian exporters to show credible decarbonisation efforts. GSCC is highly relevant for demonstrating credible, science-based decarbonisation efforts to a global audience and addressing carbon-related trade measures.

The use of science-based targets and mandatory third-party verification improves the global credibility of any emissions reduction claims made by Indonesian companies. Because the standard is technology-agnostic, it is suitable for Indonesia's diverse steel sector, which may use various methods to cut emissions. Clear product labeling requirements also help Indonesian producers effectively communicate the carbon footprint of their steel to buyers, and the standard aims to create a level playing field by measuring all producers against the same carbon accounting rules.

Potential Challenges for the Indonesian Steel Industry

Indonesian steel companies might face challenges with the GSCC standard as it requires significant technical disclosure for Measurement, Reporting, and Verification (MRV) of all emissions, especially the complex Scope 3 emissions. Meeting the ambitious science-based targets will demand substantial investment in new, cleaner technologies and processes, which could be a significant financial hurdle. Furthermore, the standard is data-intensive, demanding detailed and accurate emissions information from across the entire value chain.

Low Emission Steel Standard (LESS)

The Low Emission Steel Standard (LESS) is a European initiative designed to accelerate the decarbonisation of the steel industry by providing a harmonised, transparent framework for classifying, certifying, and labelling low-emission and near-zero emission steel. Developed by the German Steel Association (WV Stahl) in collaboration with the German Federal Ministry for Economic Affairs and Climate Action (BMWK), and governed by LESS AISBL, a Brussels-based non-profit, LESS is one of the most technically comprehensive and governance-forward standards currently guiding the transition to green steel in Europe.

LESS draws upon the emissions benchmarks first outlined by the International Energy Agency (IEA) in its 2022 report but expands them by incorporating downstream processes (e.g. refining, casting, hot rolling) and selected upstream Scope 3 emission sources (e.g. alloying elements). These additional considerations are reflected in the emission thresholds and classification rules laid out in the LESS rulebook, which applies partial surcharges based on specific steel types and input characteristics. The standard aims to support industrial decarbonisation while enabling traceability, comparability, and market recognition of low-emission steel. If the EU is a key export market, actively engaging with LESS (or ensuring products meet comparable verifiable emission intensity levels) will be crucial for CBAM compliance and market competitiveness.

Table 1.6. Alignment between SIH and LESS

LESS requirement	SIH Provision	Alignment status	Notes
Classification of steel products by CO_2 intensity (and scrap share)	SIH covers product technical requirements but does not provide a product-labelling scheme or classification scale by emissions intensity.		SIH lacks the explicit classification scheme such as the Near Zero that LESS uses.
Inclusion of upstream Scope 3 emissions (purchased goods/services)	SIH includes raw materials/ auxiliary materials and upstream considerations under technical requirements.		SIH addresses upstream inputs generally but may not have explicit boundary definition identical to LESS which discuss scope 3 in greater details
Verified CO_2 intensity for products, certification, transparent labelling	SIH includes requirements for verification (management, audits) but not a publicly-available product labelling scheme.		SIH verification exists; product labelling akin to LESS is not explicit.
Scrap-use adjustment (higher scrap share yields lower emissions threshold)	SIH includes raw material and auxiliary material and encourages resource efficiency but does not visibly include an explicit sliding scale based on scrap share for product classification.		SIH does not appear to embed scrap-share differentiated emission thresholds in its regulation text.
Technology-neutral but benchmarked toward near-zero by 2050	SIH focuses on flat-rolled steel and many emissions/ energy/water aspects but lacks explicit near-zero by 2050 benchmark or product-class progression.		Missing explicit long-term benchmarks aligned with LESS's A/Near Zero classification.

(Legend: Green = strong alignment, Orange = partial alignment, Red = not aligned)

SIH covers many of the thematic areas that LESS deals with (product inputs, emissions, upstream materials, verification). However, SIH has not yet included a specialised product classification scheme, emissions intensity thresholds tied to scrap share, and explicit labelling/ certification for low-emission steel products. For full alignment, Indonesian producers would need to introduce a product-level classification mechanism, scrap-adjusted emission thresholds, and transparent low-carbon steel labelling aligned with LESS.

Significance of LESS standard for Indonesia

Advantages for the Indonesian Steel Industry

For Indonesian steel companies that heavily target or plan to expand into the European Union market, adopting or aligning with LESS offers distinct advantages. It provides a clear roadmap for meeting specific EU buyer expectations and regulatory requirements, including the detailed emissions data needed for policies like the CBAM. If Indonesian producers aim to supply high-value, certified "green steel" to the EU, LESS offers precise benchmarks and a clear classification system. Furthermore, engaging with LESS could help Indonesian producers benchmark their own decarbonisation efforts against those of leading European steelmakers.

Potential Challenges for the Indonesian Steel Industry

The Indonesian steel industry might also face challenges with LESS due to its specific design. The standard is primarily Europe-focused, meaning its direct recognition and applicability in other major export markets for Indonesian steel, such as those in Asia or North America, might be limited compared to more globally focused standards.

LESS's highly technical and prescriptive nature—which include specific surcharges and complex classification rules demands an implementation burden that is unfamiliar to and expensive for companies outside the European ecosystem, making globally focused standards strategically more attractive. Ultimately, Asian producers lack direct influence over the standard's governance, requiring them to follow rules designed to meet European policy objectives without a commensurate voice in their creation. Additionally, its governance structure is centered on EU stakeholders, potentially offering less direct influence for Indonesian companies compared to more global initiatives.

Cases and national-level impacts of LESS

LESS is well-positioned to enhance the competitiveness of the EU steel sector by making decarbonisation efforts more visible, comparable, and investable. It supports the growth of lead markets through transparent classification and certification of low-emission and near-zero steel. The following examples show the role of LESS in the green steel transition:

Germany

Germany is both the origin and testbed for LESS. Companies such as Salzgitter AG, thyssenkrupp Steel Europe, and ArcelorMittal Germany are founding members and among the first adopters.

- Salzgitter's SALCOS (Salzgitter Low CO_2 Steelmaking) project: Transitioning to hydrogen-based direct reduced iron (H2-DRI) integrated with electric arc furnaces. LESS allows the classification of specific product lines produced under this setup, facilitating green procurement by automotive clients.
- Thyssenkrupp Steel's tkH2Steel initiative: Integrates carbon capture readiness and H2-based iron reduction. LESS certification enables disclosure of plant-level decarbonisation progress and helps justify CAPEX investments in its Duisburg plant.
- ArcelorMittal Hamburg: Uses scrap and DRI in EAFs with up to 90% renewable electricity. Certification under LESS gives visibility to lower-emission products in EU markets.

Netherlands and Belgium

Multinational production by ArcelorMittal Europe spans several EU sites. LESS provides plant-level granularity that enables:

- Product-specific classification across geographies
- Consistent emissions disclosures for CBAM compliance
- Engagement with downstream buyers such as appliance manufacturers and automotive suppliers

Aligned with the EU Sustainable Product Initiative and national green procurement policies, LESS enables the prioritisation of low-carbon materials in public tenders. It also provides traceable, product-level emissions data to support CBAM compliance and aligns with sustainable finance and ESG disclosure frameworks. Its credible labelling system builds buyer confidence, while planned expansion (stainless steel, seamless tubes, and coated product) will broaden its sectoral reach.

Overview of the standards

While all three standards aim to promote lower-carbon steel, their distinct scopes and methodologies serve different, sometimes overlapping, strategic purposes for complying companies. ResponsibleSteel offers a broad ESG assurance, appealing to stakeholders focused on holistic corporate responsibility. GSCC provides a globally-oriented, science-backed framework specifically for deep decarbonisation, crucial for companies wanting to demonstrate credible climate action. LESS offers a highly detailed, regionally-focused EU pathway that directly aligns with European policy and procurement, enabling producers to navigate and benefit from the EU's green transition.

To position Indonesia's steel sector as globally competitive and environmentally responsible, the SIH must evolve in alignment with leading international frameworks. This includes integrating broader sustainability metrics, robust carbon accounting, and product-level transparency. To strengthen Indonesia's SIH for steel, a strategic integration of these international standards will provide:

- Comprehensive metrics of sustainability: Expanding beyond current environmental metrics to include comprehensive social and governance criteria, aligning with ResponsibleSteel to appeal to broader ESG demands.
- Robust carbon accounting: Strengthen SIH's requirements for Scope 1, 2, and relevant Scope 3 emissions accounting, mandate independent verification and encourage science-based targets.This will ensure global compatibility and avoid additional burdens for exporters.
- Product-level granularity and transparency: Specific product-level classification and labeling such as LESS will provide clear categories for low-emission steel. This will enhance transparency for buyers and facilitate Green Public Procurement (GPP).

1.3 Alignment to CBAM

Based on each standard's provisions, the GSCC shows the strongest alignment with CBAM due to its technical compatibility and product-level focus, though it has a narrow ESG scope. The LESS also aligns well, but may require methodological adjustments for full CBAM compliance. ResponsibleSteel offers moderate alignment, providing robust ESG criteria and comprehensive emissions reporting, but it lacks the CBAM-specific calculations needed for direct compliance. Therefore, exporters must be strategic where ResponsibleSteel users should add EU-aligned reporting, while GSCC and LESS users must ensure their data is fully compatible with CBAM regulations to avoid penalties.

Table 1.7. Three steel international standards alignment with CBAM

Standard	Alignment with CBAM	Strengths	Gaps
ResponsibleSteel	Moderate	Offers moderate alignment with CBAM. Its main strength is its robust, third-party-audited ESG criteria and comprehensive Scope 1–3 emissions reporting.	It is not specifically tailored to CBAM and lacks EU ETS-specific calculations.
GSCC	Strong	Shows the strongest CBAM alignment due to its technical and product-level focus, which uses EU-aligned methodologies.	A narrow focus on carbon that omits broader ESG issues. It focuses less on social/governance issues
LESS	Moderate–Strong	Demonstrates strong alignment with CBAM through its clear product classification system and emphasis on verified data.	Require adaptation to meet CBAM-specific calculations such as carbon pricing

To navigate this landscape, exporters must take a strategic approach. Those utilizing ResponsibleSteel should complement their reporting with EU-aligned emissions calculation methods and product-level data. Meanwhile, exporters using GSCC or LESS are already on a better path but must ensure their data formats, reporting cycles, and emissions boundaries are fully compatible with CBAM regulatory requirements.

Table 1.8. Alignment between CBAM requirements and Indonesia Steel Green Industry Standard

CBAM Requirement	Compliance within SIH	Alignment	Notes
Scope 1 emissions reporting	Required (direct emissions measured)		SIH mandates direct emissions monitoring from fuel combustion and process emissions.
Scope 2 emissions reporting	Required (electricity use tracked)		Electricity consumption must be measured and reported under SIH.
Product-level emissions data	Not fully developed		SIH reporting is at facility-level; product-level granularity needed to meet CBAM requirements.
Use of EU ETS-aligned carbon calculation methods	Not explicitly aligned		SIH does not mandate CBAM/EU ETS-specific calculation rules.
Cradle-to-gate emissions boundary	Partial (mostly gate-to-gate)		SIH focuses on operational emissions; cradle-to-gate boundaries may not be fully defined.
Annual GHG emissions reporting cycle	Required		SIH requires annual reporting of key performance indicators, including GHG emissions.
Third-party verification of emissions data	Encouraged but not always mandatory		CBAM requires mandatory third-party verification; SIH allows self-reporting in some cases.
Carbon intensity benchmarks	Reference values exist, no caps		SIH provides benchmark values, but does not impose strict intensity thresholds like CBAM.
Regulatory enforcement and compliance	Government-regulated (Permenperin 45/2024)		SIH for sheet steel is mandatory and enforceable by the Ministry of Industry.
Compatibility with CBAM importer reporting tools	Not yet integrated		SIH formats may not be directly usable for EU importers unless adjusted.

(Legend: Green = strong alignment, Orange = partial alignment, Red = not aligned)

For a steel industry like Indonesia's, understanding these nuances is critical. The choice of standards to align with will depend on specific export market targets, investor expectations, access to technology and capital, and national decarbonisation ambitions. Compliance is increasingly a prerequisite for market access, a tool for risk mitigation, and a lever for competitive advantage in the evolving global steel landscape.

For SIH to serve as a reliable pathway for CBAM compliance, Indonesia may consider updating its standard to incorporate EU-compatible reporting practices, enforce mandatory third-party MRV, and establish product-specific emissions tracking. This would not only facilitate smoother access to EU markets for Indonesian steel producers but also strengthen the international credibility of SIH as a green industry benchmark.

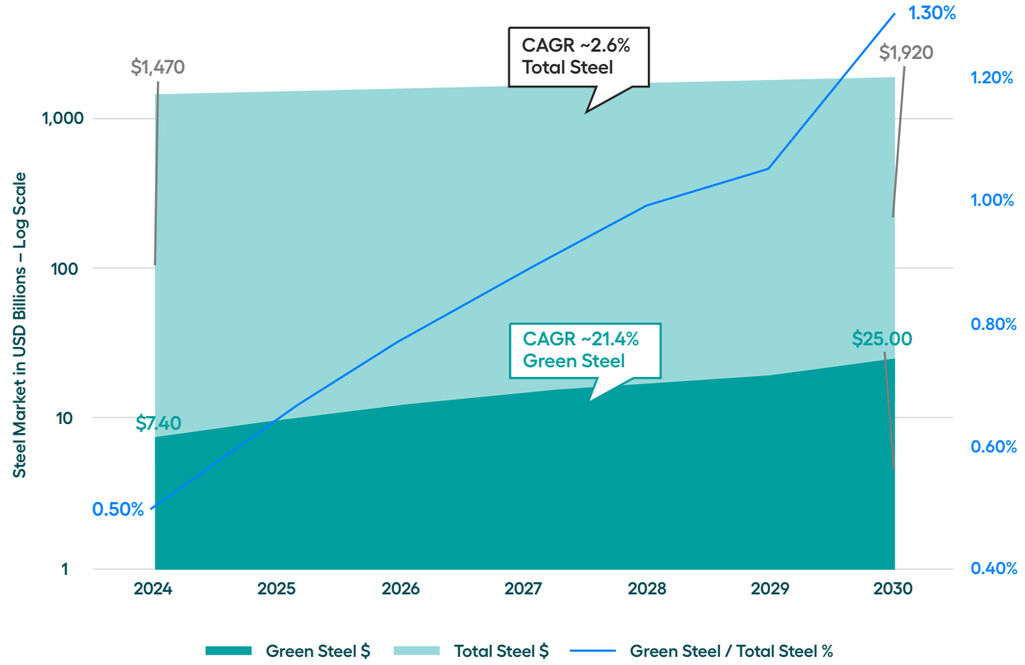
While the implementation of SIH has faced challenges, such as regulatory inconsistencies in broader green industry development and initial voluntary application for many sectors, the government's intention to selectively enforce these standards as mandatory signifies a powerful commitment to a more sustainable and environmentally accountable industrial future.

Chapter 2: Trends on Low-Carbon Steel Demand in the Global and Domestic Market

2.1 Shifting market signals: The global demand for low-carbon steel

The global demand for low-carbon steel is rapidly escalating. The global green steel market is conservatively estimated to reach US$20 billion by 2030, showing a high Compound Annual Growth Rate (CAGR) of 21.4 per cent (see Figure 2.1 below). Although currently a small part of the total steel market, it is expected to nearly triple its market share by 2030.[2] This surge is primarily fueled by stringent policies, including the European Union's (EU) Carbon Border Adjustment Mechanism (CBAM). CBAM is a trade and climate policy tool that adds a carbon price to certain imported goods, including steel to ensure that companies outside the EU face similar carbon costs as those within the region of the EU Emissions Trading System (ETS).

Figure 2.1. Green Steel vs. Total Steel Growth (2024–2030)



(Source: Green Steel Industry Growing Fast with 21.4% CAGR)

2 Steel Meets Rising Global Electricity Demand

In 2023, the EU imported roughly 40 million tonnes of steel, a large portion of it comes from from countries with no equivalent carbon pricing[3] such as India, China, South Korea, Türkiye, and Indonesia. In many of these countries, steel is still produced using a high-emitting BF–BOF process in contrast to EU producers who are progressively shifting to EAF powered by renewable energy.

Regulations such as CBAM act as a demand-side driver for low-emission steel. It creates a clear market signal that rewards cleaner production and penalises carbon-intensive processes. For countries like Indonesia and India, which are expanding their steel industries, the message is direct: competitiveness in the EU and other high-ambition markets will depend not just on price or scale, but on carbon performance. As these countries develop industrial strategies and invest in future capacity, alignment with global climate and trade standards is becoming essential.

Across developed economies, CBAM-related discussions are increasingly shaping industrial and trade policy directions. While the United Kingdom and EU are advancing structured CBAM designs, the United States and Australia are still debating frameworks to align carbon pricing with trade competitiveness. East Asian economies such as Japan and South Korea remain cautious, focusing on strengthening domestic carbon markets and technological innovation rather than adopting border measures. China's approach is more defensive, emphasising ETS expansion and export competitiveness. These varied responses reflect a convergence toward carbon transparency and trade–climate integration, even if policy instruments differ. For emerging economies, this underscores the urgency of enhancing emissions reporting systems, aligning domestic standards with international benchmarks, and investing in low-carbon steel technologies to remain competitive in a tightening global trade regime.

Table 2.1. CBAM industry response in developed economies

Countries	CBAM Compliance and timeline	Industry response for low-carbon steel	Policy shift due to CBAM
United Kingdom	• 2023: Consultation stage • 2024: Design stage • 2025-2026: Parliamentary review • Plans to introduce CBAM by 2027	• Positive industry response. • UK Steel and other stakeholders support rapid CBAM rollout to prevent import of high-emissions steel after EU CBAM takes effect.	• Integration of climate and trade policy. • Plans to create UK CBAM aligned with the EU model.
United States	• No formal CBAM yet. • Multiple proposals under discussion: Foreign Pollution Fee Act, Clean Competition Act, PROVE IT Act.	• Mixed responses. • Industry concerned about cost impacts but supportive of carbon transparency. • Section 232 tariffs create indirect carbon-based trade effects.	• Legislative momentum for carbon-adjusted trade. • Growing alignment of emissions data with trade policy foundations.
South Korea	• Engaged in EU CBAM consultations. • Requests for K-ETS recognition and transition phase flexibility	• Strong resistance from KOSA and steel producers like POSCO. • Concerns over data reporting and competitiveness. • Investment in hydrogen steelmaking is ongoing.	• Strengthening of domestic K-ETS. • Expanded carbon market reforms. • WTO engagement on CBAM implications.
Japan	• No CBAM yet. • 2023: Feasibility study launched. • Piloting emissions trading under Green Transformation (GX) initiative.	• Strong opposition to EU CBAM. • Japan Iron and Steel Foundation (JISF) argues against complexity and lack of fairness. • Industry investing in green steel innovation.	• Initial steps toward carbon pricing integration. • Policy focus remains on market access and innovation partnerships.
China	• Expanding national ETS to cover steel, cement, aluminium by 2025. • Developing product carbon footprint standards (targets for 2027–2030).	• Criticised EU CBAM as protectionist. • Growing pressure on exporters to reduce carbon intensity. • Some movement toward EAF adoption and green steel pilots, but blast furnaces still dominate.	• Expansion of ETS coverage. • Introduction of product carbon footprint rules. • Encouraging cleaner steel production technologies.
Australia	• CBAM under review. • 2023 Carbon Leakage Review proposed phased approach. • EU CBAM prompting readiness among exporters.	• Early compliance preparations encouraged. • Industry concerned about carbon intensity benchmarks and cost impacts.	• Safeguard Mechanism alignment discussions. • Growing policy focuses on trade risks and green steel demand signals.

3 CBAM: What it means for importers and exporters of steel, iron and aluminium | The Carbon Trust

European buyers are beginning to change their procurement strategies, giving preference to suppliers who can prove lower carbon footprints and meet the EU's reporting standards. According to CarbonChain, a growing number of companies are investing in emissions tracking systems and adapting their production routes in response to these incentives.[4] In regions like Southeast Asia, where BF–BOF remains dominant, the CBAM is triggering discussions around shifting to EAF or direct reduced iron (DRI) technologies. These methods are less carbon-intensive, especially when paired with renewable electricity or green hydrogen.

Emerging low-carbon steel demand from Canada

Canada's increasing federal carbon pricing system directly incentivises industrial consumers to reduce their carbon footprint, making low-carbon steel a more attractive and economically competitive choice. Both federal and provincial governments are also actively implementing green procurement policies, increasingly prioritising materials with lower embodied carbon for large-scale public infrastructure projects in construction and transportation.

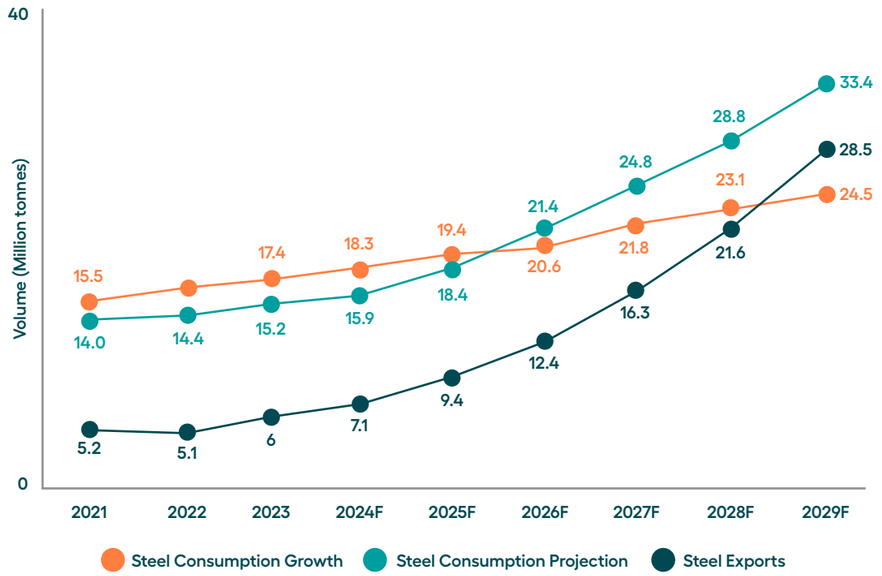
A key driver is Canada's significant automotive manufacturing sector, tightly integrated into the North American market. Major automakers' decarbonisation commitments are creating immense supply chain pressure for Canadian suppliers to incorporate green steel. This demand is further bolstered by a growing domestic supply, with major Canadian steel producers like ArcelorMittal Dofasco and Algoma Steel heavily investing in large-scale decarbonisation projects, including transitions to EAF technology with DRI. The expansion of the local supply chain will make sourcing low-carbon steel increasingly feasible and appealing for Canadian buyers, accelerating its adoption across various industries.

2.1.3 Implications for Indonesia

For Indonesia, carbon regulations like CBAM present both a risk and an opportunity. Without certified emissions data and a continued focus on carbon-heavy production, Indonesia faces higher trade penalties and exclusion from key markets. However, the country's growing industrial base, renewable energy potential, and strong regional standing provide a good foundation for adopting green practices. To stay competitive, Indonesia must better link its climate goals with its industrial and export strategies. Closing the gap between national targets and industry action is crucial in a global economy that increasingly values low-carbon products.

4 How will EU CBAM affect metal trade | CarbonChain

Figure 2.2 Projection of Production, Export, and Consumption (2021 - 2029)



Source: CELIOS, 2025

Indonesia's steel industry is especially exposed to countries that are implementing carbon-focused trade rules. Figure 2.2 above shows that Indonesian steel growth is still dependent on the export market. However, there is an increasing trend on the domestic consumption with a prospect of a domestic market driven by the development of key sectors such as infrastructure, automotive and property. This growing domestic base provides an essential opportunity to respond to the growing need for global low-carbon steel. The graph depicts a critical crossroads where the current export dependency necessitates urgent decarbonisation to mitigate external financial risk, while the rising domestic market offers the strategic pathway and potential early demand to finance that transition.

In addition, while current steel exports to the EU are relatively small, this is changing. A 2025 CSIS report indicates CBAM still generates measurable welfare losses for Indonesia approximately US$36 million and poses a disproportionate risk to the ferrous metals sector, highlighting the steel industry's specific vulnerability to carbon-related trade pressure.[5] Without improved systems for tracking and verifying emissions, Indonesian producers could face the risk of higher costs, limited market access, and a damaged reputation. This highlights that clear emissions data and compliance are quickly becoming essential for global competitiveness.

5 Working paper: The EU Carbon Border Adjustment Mechanism (CBAM): Implications for Indonesia

While Indonesia acquired fundamental policies that are crucial for steel decarbonisation, the stakeholders' responses remain fragmented. Several companies have started early discussions on monitoring, reporting, and verification systems, but there is no unified national approach. A 2024 PSE UGM study on CBAM dynamics confirms this gap, noting that most producers lack plant-level MRV protocols and track emissions insufficiently for international standards.[6] This makes it hard for exporters to prove compliance and avoid high default carbon penalties.

As more economies adopt similar mechanisms, policies such as CBAM serve as a signal of future trade conditions. The Indonesian government has acknowledged the implications of CBAM. At the 2024 Munich Security Conference, Finance Minister Sri Mulyani Indrawati highlighted the unequal footing of developing countries in adapting to global carbon pricing.[7] In response, Indonesia has taken several steps:

- A carbon tax of IDR 30 per kilogram CO_2e (about US$2.1 per tonne), targeted at coal-fired power, though implementation has been delayed to 2025
- The launch of IDXCarbon in 2023, a national carbon exchange platform, has seen its total traded volume reach nearly 1.6 million tonnes of CO_2e by mid-2025 (Jakarta Globe, 2025)
- Incentives under the Omnibus Law have been enacted to attract investment in renewable energy and low-carbon technologies through tax breaks and streamlined permits (Norton Rose Fulbright, 2025)

Despite these initiatives, challenges remain. Participation in IDXCarbon is low, and the carbon price is well below international benchmarks. The carbon tax applies to a narrow segment of emissions, and currently, the SIH is still under voluntary compliance and not recognised by EU regulators.[8] Many Indonesian businesses are still uncertain about CBAM's operational requirements, including verification and certification.[9] There are also concerns about social impacts such as higher costs and employment risks. Without clearer regulation, investment in emissions tracking, and stronger coordination between climate and trade policy, Indonesia may fall behind other countries preparing for carbon-based trade measures.

However, the government has begun signalling stronger intent to align with international mechanisms. Apit Pria Nugraha, Head of the Green Industry Center at the Ministry of Industry, noted that Indonesia is "now working hand in hand with the [European] Commission to establish a mandatory carbon market" as part of efforts to offset potential CBAM tariffs.[10] This aligns with

6 CBAM Dynamics and Industrial Decarbonization in Indonesia: Case of Steel Industry
7 Carbon Leakage, Leaking Policies: How the EU's CBAM Is Impacting Indonesia and Taiwan
8 Readiness of the European trading countries toward carbon border adjustment mechanism: Evidence from Indonesia - ScienceDirect
9 Indonesia May Lose Steel and Ammonia Exports with EU Carbon Tax | Earth Journalism Network
10 Indonesia developing ETS ahead of EU CBAM introduction | Latest Market News

the Ministry's wider agenda to build a "green industry ecosystem" through the introduction of emission restrictions across key subsectors, including iron and steel by 2027.[11]

2.2 Domestic Low-Carbon Opportunities Under Green Public Procurement (GPP) Policy Scenario

2.2.1 GPP as a policy tool to create a market signal and promote infrastructure

GPP stands out as a powerful policy tool that governments can strategically employ to generate a strong demand for commodities such as low-carbon steel. At COP 28, Austria, Japan and the United Arab Emirates signed a statement of intent to work towards key aspects of the Industrial Deep Decarbonisation Initiatives (IDDI) GPP Pledge which covers around 22% of the global steel market[12].

By integrating emissions intensity thresholds into the procurement processes, governments can leverage their significant purchasing power to directly influence demand within the domestic industry. This approach not only encourages the adoption of cleaner production methods by domestic steel manufacturers but also promotes the development of a market for low-carbon alternatives.

However, many existing green public procurement policies are often too broad, targeting lower emissions that can be met with current market technologies (e.g., top 20-40% performers or increased material efficiency), rather than explicitly demanding or financially supporting truly near-zero emission materials (IEA, 2024[13]). This limits the strong, clear demand signal needed to spur investment in transformative decarbonisation technologies.

11 Green Supply Chains as a National Strategy for Indonesia's Global Competitiveness - Ecadin
12 UNIDO: Green Public Procurement
13 IEA, 2024: Breakthrough Agenda Report

Case studies: GPP approaches in Asia

India

While India does not yet have a formal GPP policy for steel, the Ministry of Steel has introduced a Green Steel Taxonomy classifying finished steel by emission intensity: 5-star (<1.6 tCO_2/tfs), 4-star (1.6–2.0 tCO_2/tfs), and 3-star (2.0–2.2 tCO_2/tfs). The government is reportedly considering a mandate requiring around 20 percent of steel used in public projects to meet at least the 3-star rating, with additional targets of about 5 percent from 4-star and 1 percent from 5-star producers by 2028. Anchored in the forthcoming National Green Steel Mission, this initiative aims to create a domestic demand signal for low-carbon steel, de-risk private investments, and align industrial policy with India's broader decarbonisation and competitiveness goals.

Vietnam

Vietnam's GPP framework is anchored in its sustainable development and green growth strategies, reflected in the Law on Environmental Protection (Article 146) and the Law on Bidding (Article 10). These provisions prioritise green procurement for state-funded projects and allow preferential treatment for bidders offering environmentally friendly products. The Vietnam Green Label Programme, established in 2009, serves as the country's main eco-labelling system to support public and private green purchasing. While this foundation signals growing institutional support, implementation remains limited. There are no binding regulations requiring agencies to adopt GPP, and coordination among government, research institutions, and the private sector is still weak, constraining efforts to scale up demand for low-carbon materials such as green steel.

Malaysia

Malaysia introduced its GPP policy in 2013 under the National Green Technology Policy (NGTP) and Green Technology Master Plan (GTMP) to advance sustainable public spending. The Ministry of Finance Treasury Circulars make GPP mandatory for all federal ministries and agencies, implemented through the MyHIJAU Programme, which includes the MyHIJAU Mark eco-label and product directory to guide green purchasing. Malaysia targets at least 25 percent of total procurement to be green by 2025, though progress is constrained by the absence of a Procurement Act to ensure enforcement at subnational levels. However, the MyHIJAU criteria also do not yet define clear metrics for low-carbon steel, limiting the framework's direct impact on stimulating demand for greener industrial materials.

2.2.2 Domestic market opportunities if driven by the Green Public Procurement (GPP) policy on steel

Indonesia has a strong legal foundation for Green Public Procurement (GPP), which can significantly boost its green steel industry. Presidential Regulation No. 12 of 2021 formally introduced "Sustainable Public Procurement," aiming to shift government buying from just cost to also considering economic, social, and environmental benefits. The National Public Procurement Agency (LKPP) is responsible for putting these mandates into practice, issuing detailed guidelines like LKPP Decree No. 157 of 2024 to integrate sustainability criteria into procurement.

Effective October 2024, Permenperin No. 45 Tahun 2024[14] marks a critical regulatory pivot for Indonesia's energy-intensive industrial sector. By mandating adherence to Green Industry Standards (SIH) specifically for sheet steel production the government clearly signals a top-down commitment to enforcing sustainable practices. The SIH for sheet steel has set criteria for emissions, energy, water, and waste, signaling a strong top-down commitment to sustainable practices. This will then drive investment, de-risk low-carbon technologies like EAFs and green hydrogen DRI, and foster innovation, attracting new players and expanding existing green production.

The establishment of SIH shows that the Ministry of Industry recognises the strategic importance of green steel for the national economy and achieving net-zero targets, thus, seeing GPP as a key driver. To act on this further, the government needs to advance a steel decarbonisation roadmap, exploring green financing, tax incentives for green steel, and potentially higher tariffs on carbon-intensive steel imports to protect domestic green production.

However, the government's recognition of GPP is significantly limited, as the framework is still weakly implemented and executed. This resulting implementation gap means that the GPP system has not yet been able to generate the necessary market signal through strong domestic purchasing power, hindering local producers from investing heavily in low-carbon steel.

In order to achieve successful GPP, the policies need to create guaranteed, high-value demand for green steel, effectively de-risking early investment in cutting-edge technologies such as hydrogen-DRI. The strategic assertion, therefore, is that Indonesia must substantially strengthen and enforce its GPP framework to bridge the domestic capacity for green steel with its crucial export ambitions, ensuring that local investments are protected and scaled before fully facing the competitive pressures of global markets like the EU CBAM.

14 Permenperin No.45/2024: https://peraturan.bpk.go.id/Details/307888/permenperin-no-45-tahun-2024

Conclusion

The Indonesian steel industry, despite its rapid growth and critical role in global supply chains, faces an urgent imperative to transition due to its reliance on high-emitting BF-BOF technology and high carbon intensity. While Indonesia's direct export exposure to the EU is currently modest, the CBAM and proliferation of global carbon regulations signal a tightening trade environment that could present future vulnerability and welfare losses. The root of this challenge lies in the fragmented global definition of low-carbon steel. This creates sides between the scrap-dependent sliding scale mechanism and the process-agnostic standards in the effort of lowering steel production emission intensity. Given Indonesia's low domestic scrap availability, the national strategy must be firm in prioritising the absolute emission reduction through carbon intensity (tCO_2e/t steel) across all production routes, thereby making essential investments in BF-BOF efficiency and the long-term shift to green hydrogen-DRI economically viable.

Indonesia must ensure its domestic standard is globally credible. While the SIH provides a good technical foundation across environmental and management aspects, the report finds it needs immediate upgrading to mandate mandatory third-party verification, explicit Scope 3 emission accounting, and product-level carbon intensity tracking. Aligning the SIH's Measurement, Reporting, and Verification (MRV) systems with international frameworks would significantly improve the credibility of the standard. By integrating these robust governance and disclosure requirements, Indonesia will not only facilitate smoother CBAM compliance but will also significantly enhance the global credibility of its steel producers, positioning the sector for long-term sustainable growth and competitive advantage in the global green economy.

Finally, the primary policy mechanism to de-risk the technological transition is through the GPP framework. Although Indonesia has a robust legal foundation, weak implementation has resulted in an insufficient domestic market signal. Therefore, the government must substantially strengthen and enforce GPP to act as a guaranteed buyer for early-stage low-carbon steel. This strategic domestic demand is critical to bridge the high capital expenditure required for hydrogen facilities, allowing local investments to be protected and scaled before facing global competitive pressure. Furthermore, this focus must be supported by continuous and decisive investment in scaling EAFs and strategically embracing DRI technology.

Climate Catalyst