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2026**



Great expansion, greater responsibility

Nippon Steel Corporate Climate Assessment
2026 Update



STEELWATCH

Bringing climate urgency to steel

Acknowledgements

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Cover photo: Nippon Steel's Kyushu Works, Yawata Area. SteelWatch.

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*U. S. Steel's Gary Works, Indiana
SteelWatch, April 2026.*



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List of acronyms

AM/NS India	ArcelorMittal/Nippon Steel India	H2-DRI	Hydrogen-based Direct Reduction of Iron ore
BF	Blast Furnace	HBI	Hot briquetted iron (transportable direct reduced iron)
BF-BOF	Blast Furnace-Basic Oxygen Furnace	JISF	Japan Iron and Steel Federation
CCS	Carbon Capture and Storage	JOGMEC	Japan Organization for Metals and Energy Security
CO2	Carbon dioxide	LNG	Liquefied Natural Gas
CO2e	Carbon dioxide equivalent	MENA	Middle East and North Africa
DRI	Direct Reduction of Iron ore	Mt	Million tonnes
EAF	Electric Arc Furnace	Mtpa	Million tonnes per annum
GX	Green Transformation	t	tonne
GHG	Greenhouse gas	tCO2	tonnes of carbon dioxide
H2	Hydrogen		



Coal mining at an open pit
Licensed stock photo

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Executive Summary

Nippon Steel's global ambition is fundamentally reshaping the company. Its acquisition of U. S. Steel marks one of the most significant corporate transformations in the global steel industry in decades. This is not only an expansion of operations, but a significant enlargement of the company's responsibility to protect communities and the global climate.

Disappointingly, Nippon Steel has already failed its first test. While substantial capital is yet to be allocated, its first act for wholly-owned subsidiary U. S. Steel was to invest in relining a coal-based blast furnace. More critical decisions lay ahead, but **committing to continued fossil fuel use while ignoring the well-documented health, climate and environmental damage that comes with it, sets an undignified precedent.**

That said, the company is not lacking potential for positive change. In Japan, Nippon Steel has announced additional investments in increasing electric arc furnace (EAF) capacity, aiming to "establish production sites that will lead the world in the carbon neutral era."¹ The company has also begun to reference procurement of direct reduced iron (DR iron) more openly as part of its future decarbonisation pathway. Most recently, in the US it announced construction of a new direct reduction of iron ore (DRI) facility at its Big River plant in Arkansas,² indicating a potential shift in its approach.

However, these efforts remain limited in scale and pale in comparison to the continued dominance of coal-based blast furnace production in the company's growing global fleet. This imbalance is detailed in the SteelWatch Corporate Scorecard, released in March 2026, in which Nippon Steel ranks near the bottom among major global steelmakers, ranking 17th out of 18 companies.³

The major challenge for Nippon Steel is responsibly aligning its expanding global footprint with the necessary targets and actions that reflect the urgency of the climate crisis.

This report outlines key developments in 2025, assesses the company's emissions profile, and examines the technological investments and policy frameworks that underpin its decarbonisation strategy, while surfacing the challenges with its climate strategy.

These analyses show a clear conclusion: as Nippon Steel expands globally, its climate strategy is not keeping pace with its climate responsibilities. The company is also unprepared to meaningfully engage with impacted communities, because that would mean a fundamental rethinking of its coal-based business model.

The pathway forward is clear: a plan to phase out coal-based asset before their end of life, combined with an early and large-scale shift to near-zero-emissions⁴ ironmaking is essential. This must be underpinned by a socially just transition strategy that protects workers and communities and is consistent across both domestic and global operations.



*Nippon Steel's East Japan Works, Kimitsu Area.
SteelWatch, February 2026.*

- 1 [Nippon Steel](#), Commences Construction for the EAF Process Transition Project at the Kyushu Works Yawata Area, 15 April 2026.
- 2 [U. S. Steel](#), U. S. Steel Announces First-Of-Its-Kind In The United States Dri Facility At Big River Steel Works, 29 April 2026.
- 3 [SteelWatch](#), SteelWatch Corporate Scorecard, 31 March 2026.
- 4 Residual greenhouse gas emissions at a level consistent with a sectoral 1.5C-aligned pathway as outlined by the IEA (2022). This would be achieved through the onsite emissions reductions rather than offsets.

1. What's new with Nippon Steel in 2025-26

Overview of Nippon Steel Corporation

Nippon Steel Group⁵ is the world's fourth-largest steel producer, with crude steel production exceeding 43.64 Mt in FY 2024.⁶ For the fiscal year ending March 2026 (FY2025), the company reported consolidated sales revenue of approximately JPY 650.4 billion (USD 4.1 billion).^{7,8}

Nippon Steel alone produced 34.3 Mt of crude steel,⁹ and the majority of its production capacity relies on coal-based blast furnaces. The company currently operates 10 blast furnaces in Japan. According to Global Energy Monitor,¹⁰ the combined ironmaking capacity of these furnaces reaches 42.4 Mtpa, making it the second-largest corporate ironmaking capacity in the world, after ArcelorMittal, with operations in 15 countries. Of the 10 blast furnaces, only one (Yawata Blast Furnace No.4) is scheduled for closure by FY2030.¹¹

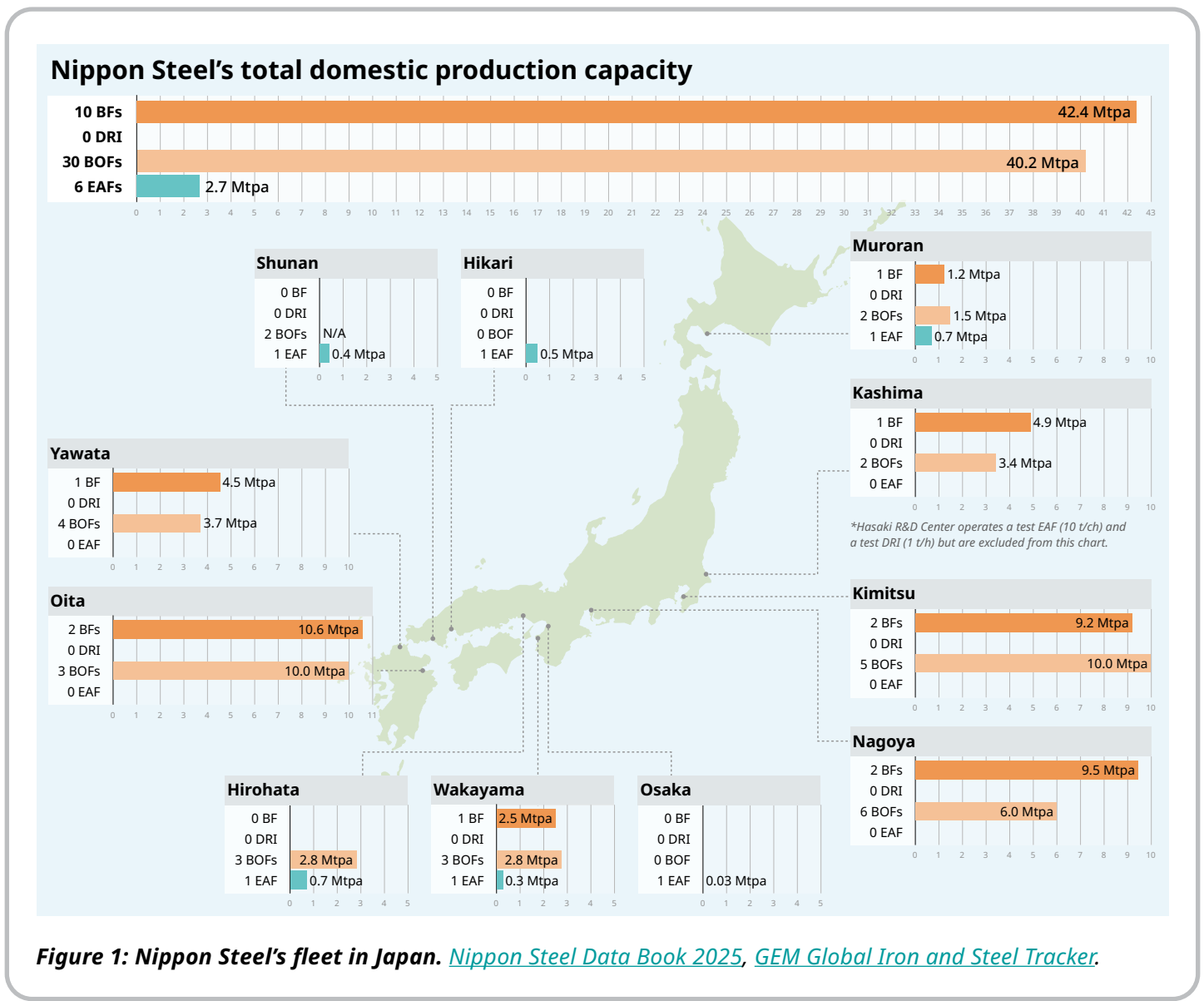


Figure 1: Nippon Steel's fleet in Japan. [Nippon Steel Data Book 2025](#), [GEM Global Iron and Steel Tracker](#).

5 Based on ownership structures as of 31 December 2024, including subsidiaries such as Nippon Steel Stainless Steel Corporation, Sanyo Special Steel, Ovako (Sweden), 40% AM/NS India, and 22% USIMINAS (Brazil). Excludes U. S. Steel, acquired in June 2025.

6 [World Steel Association](#), *World Steel in Figures 2025*, Retrieved 1 May 2026.

7 Converted using the exchange rate as of 24 May 2026 (JPY 1 = USD 0.00628).

8 [Nippon Steel](#), *FY2025 Financial Results*, 13 May 2026.

9 [Nippon Steel](#), *Nippon Steel Data Book 2025*, p.18, September 2025.

10 [Global Energy Monitor](#), *Global Iron and Steel Tracker*, March 2026.

11 [Nippon Steel](#), *Nippon Steel's GX Initiatives*, p.18, 13 March 2025.

Following the acquisition of U. S. Steel in June 2025, a major strategic expansion for the company, Nippon Steel formulated its “2030 Medium- to Long-Term Management Plan” in December 2025. The plan sets out an overseas business strategy centred on strengthening integrated steel production in these priority geographies: the United States, Europe, India and Thailand.¹²

In line with this strategy, Nippon Steel has been restructuring its portfolio of overseas equity-accounted affiliates before and after the U. S. Steel acquisition. In July 2024, the company announced the sale of its 50% stake in a joint venture with Baoshan Iron & Steel (China) for automotive steel sheets,¹³ followed by the sale of its shares in POSCO (South Korea) in September 2024.¹⁴ In June 2025, as the acquisition of U. S. Steel concluded, Nippon Steel announced the divestment of its 50% stake in the ArcelorMittal Nippon Steel Calvert (AM/NS Calvert) joint venture in the US, in order to address regulatory concerns, for a nominal USD 1 to ArcelorMittal.¹⁵ In November 2025, Nippon Steel also signed an agreement to transfer its stake in Usiminas (Brazil) to Ternium, marking its exit from Brazil.¹⁶

Nippon Steel's international expansion has significantly increased its decarbonisation responsibility. Its acquisition of U. S. Steel, which includes operations in the US and Slovakia, has added around one-third of its total emissions on top of the current level (see Figure 2). **Nippon Steel's decisions now shape emissions across multiple countries, not just within Japan.**

The company does disclose emissions and reduction targets across its operations, but greater clarity is needed on how these different transition pathways are positioned within a coherent group-wide decarbonisation strategy. The company's 2050 carbon neutrality target is currently only applicable to its Japanese fleet,¹⁷ and its plan to reach even this domestic target is uncertain (see [Chapter 2](#)).

Nippon Steel previously stated that “the company alone accounts for most of the total CO2 emissions of the group,” and that its targets could therefore be regarded as broadly covering the group as a whole.¹⁸ However, with the addition of U. S. Steel's emissions, this logic no longer holds, and the company's emissions targets and transition plans require reassessment at the group level. The company's Carbon Neutral Vision 2050 must be updated to take responsibility for the significant emissions of its overseas operations.

The climate crisis is a global challenge, and emissions reductions limited to domestic operations are simply insufficient. This also applies to equity-accounted affiliates, where engagement must go beyond mere “support”¹⁹ to ensure effective action. The company is expected to fully recognise the impact of its business activities on global emissions and respond with responsibility commensurate with that impact.



**Nippon Steel's
decisions now shape
emissions across
multiple countries,
not just
within Japan.**

12 [Nippon Steel](#), *Nippon Steel 2030 Medium- to Long-term Management Plan*, p.22, p.23, 12 December 2025.

13 [Nippon Steel](#), *Withdrawal from the Joint Venture for Automotive Steel Sheets in China*, 23 July 2024.

14 [Nippon Steel](#), *Sale of Shares of POSCO Holdings Inc.*, 24 September 2024.

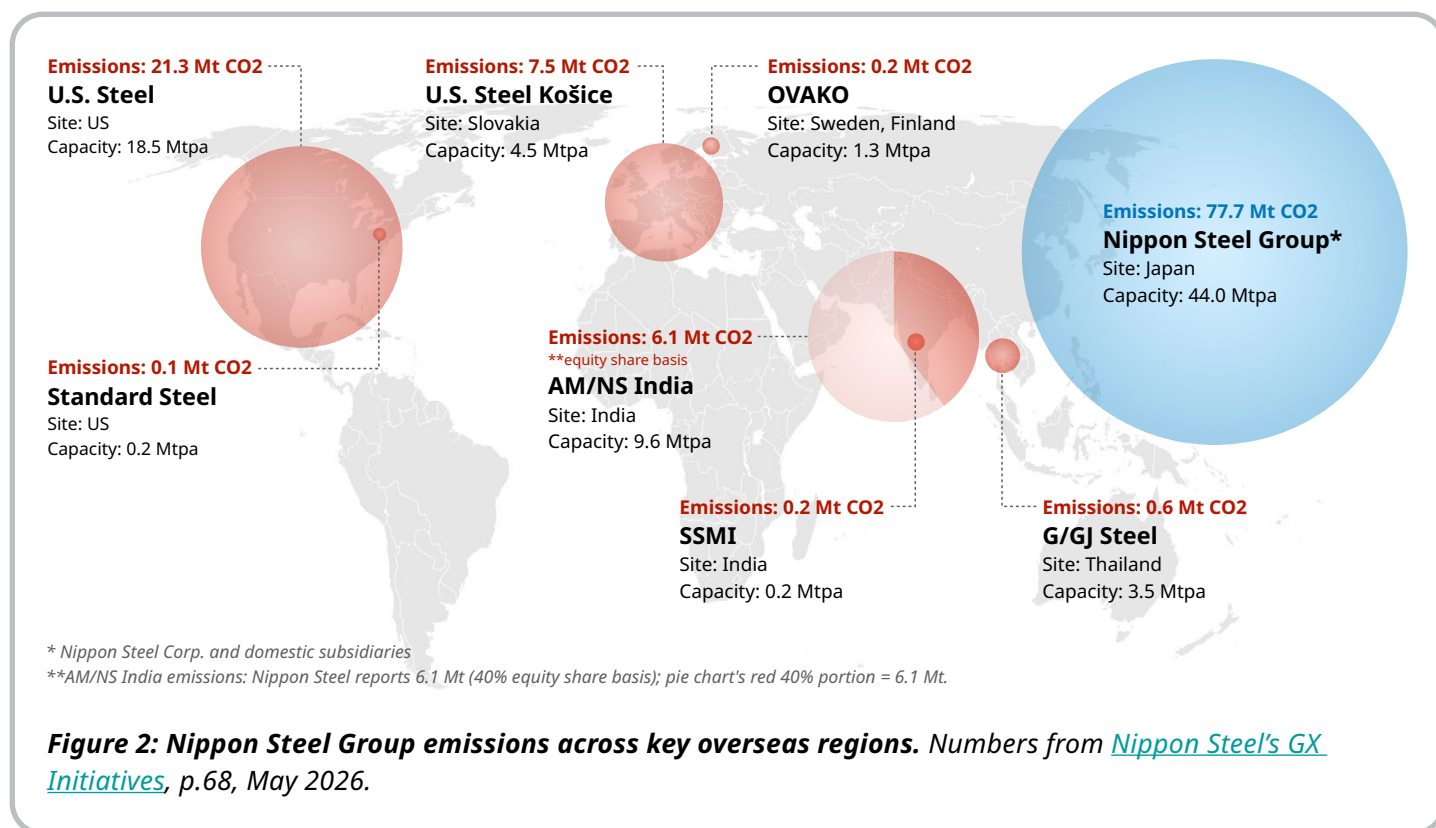
15 [Reuters](#), *Nippon Steel warns of annual loss due to charges related to US Steel acquisition*, 2 August 2025.

16 [Nippon Steel](#), *Nippon Steel and Ternium Sian Share Sale and Purchase Agreement for Usiminas Shares*, 5 November 2025.

17 [Nippon Steel](#), *Nippon Steel Integrated Report 2025*, p.49, 2 October 2025.

18 [Nippon Steel](#), *Nippon Steel Carbon Neutral Vision 2050 Briefing Summary of Q&A*, 30 March 2021.

19 [Nippon Steel](#), *Nippon Steel's GX Initiatives*, p.65, 13 March 2025.



Expanding investment and structural risks

Since SteelWatch's 2025 analysis, the most significant structural change at Nippon Steel has been the completion of its acquisition of U. S. Steel in June 2025.²⁰

The acquisition was first announced in December 2023²¹ as a USD 14.9 billion all-cash deal, representing a premium of around 40% over U. S. Steel's share price at the time. Nippon Steel subsequently expanded its financial commitments, announcing USD 1.4 billion in additional investment in March 2024,²² followed by a further USD 1.3 billion in August 2024.²³ In 2025, the company unveiled a USD 14 billion investment plan on top of the acquisition cost itself.

In parallel, attention had focused on the direction of post-acquisition capital investment. In late 2024, it was reported that, in a letter sent by Nippon Steel to U.S. Steel employees, the company had committed to the long-term operation of six coal-based blast furnaces (two at the Mon Valley Works and four at Gary Works).²⁴ Amid these signals suggesting the continued use of coal-based blast furnaces, the acquisition was formally completed in June 2025.

Fate of U. S. Steel USD 14 billion investments

Nippon Steel has announced that, of its planned capital expenditure of up to USD 14 billion, USD 11 billion is committed to be invested by the end of 2028. These investments have been agreed under the framework of the National Security Agreement (NSA) and the "golden share."²⁵ Nippon Steel estimates that these investments will generate around USD 3 billion in annual improvement effects, including gains from capital investment and operational synergies.²⁶

²⁰ [SteelWatch](#), *SteelWatch Corporate Scorecard*, 31 March 2026.

²¹ [Reuters](#), *Japan's Nippon Steel to acquire U.S. Steel for \$14.9 billion*, 19 December 2023.

²² [WSJ](#), *Biden Opposition to Takeover of U.S. Steel Comes After Months of Lobbying*, 14 March 2024.

²³ [Reuters](#), *Nippon Steel to make additional investment in US Steel's mills*, 30 August 2024.

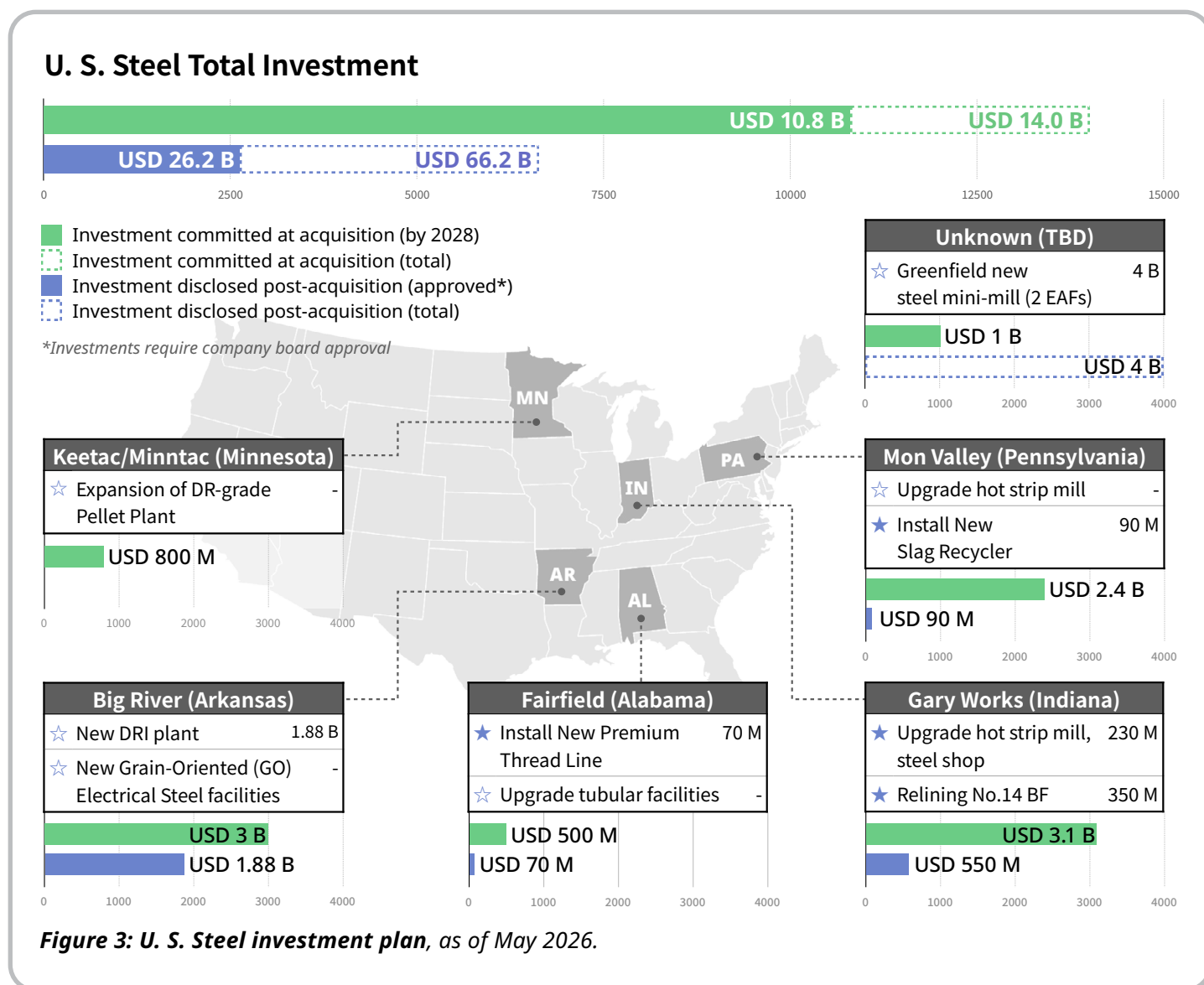
²⁴ [Japan Metal Daily](#), *Nippon Steel / Acquisition of US Steel / Announcement of Additional Commitments / Six currently operational blast furnaces to remain in service long-term: "to be refurbished by 2030"*, 11 December 2024.

²⁵ Under the NSA, the US government holds a "golden share" in U. S. Steel, allowing it to veto decisions such as reducing capital investment or closing facilities. These powers are currently held by the president and will later transfer to the Treasury and Commerce Departments ([AP News](#)).

²⁶ [Nippon Steel](#), *Q2 FY2025 Financial Result*, p.10, 5 November 2025.

The United States Securities and Exchange Commission (SEC) disclosures indicate broad allocations of the USD 11 billion investment plan. One year after the acquisition, USD 6.6 billion has been specifically allocated (see Figure 3).

The latest U. S. Steel management plan touted this as a once-in-a-generation transformation,²⁷ but so far there is no indication that its investments will drive rapid decarbonisation efforts at existing plants with blast furnaces. While the USD 11 billion commitment provides a window of opportunity to modernise and decarbonise the legacy plants of U. S. Steel, its actual impact will ultimately depend on how these yet-to-be-specified investments are allocated.



The investments disclosed by May 2026 (totalling USD 6.6 billion) include USD 4.0 billion for the construction of a new greenfield steel plant equipped with two large EAFs (3 Mtpa).²⁸ In addition, the company has announced plans to invest USD 1.9 billion investment in the construction of a new DRI plant at Big River.²⁹

At the same time, Nippon Steel announced in December 2025 the restart of one idled blast furnace at Granite City Works in Illinois.³⁰ In the same month, it also approved a USD 350 million relining of BF No.14 at Gary Works in Indiana.³¹ While both decisions have been explained as necessary to maintain production, they effectively represent investments that ensure the continued operation of coal-based blast furnaces.

27 U. S. Steel, *Medium-to Long-Term Management Plan 2025*, 4 November 2025.

28 Reuters, *Exclusive: Nippon Steel to invest \$4 billion for new US Steel mill in \$14 bln package, document says*, 20 May 2025.

29 U. S. Steel, *U. S. Steel Announces First-Of-Its-Kind In The United States Dri Facility At Big River Steel Works*, 29 April 2026.

30 Scheduled to restart in the April to June quarter of 2026 (Nikkei Asia, December 2025).

31 Scheduled to be carried out over approximately 100 days between May and August 2026 (Nikkei, December 2025).

Rising pressure in the US and social responsibility

Post-acquisition decisions so far indicate that maintaining and extending existing blast furnaces is being prioritised over a transition to near-zero-emissions capable technologies. This has drawn criticism from the US media about continued reliance on coal-based steel production.³²

At the same time, labour safety and environmental concerns at these aging facilities are becoming increasingly apparent. In August 2025, the most recent explosion at a coke oven at the Clairton Plant (Mon Valley) resulted in fatalities and injuries.³³ The site has also faced significant environmental penalties in the past.³⁴

Air pollution from blast furnaces continues to have serious impacts on local communities.³⁵ For U. S. Steel's major plants, emissions are estimated to be linked to a substantial number of health impacts each year.³⁶ These findings underscore the need for a fundamental response from both environmental and social risk perspectives.

“Whenever I walk out the door, the rotten egg smell from sulphur hits me hard, showing it’s highly concentrated.”

Residents living near the Gary Works³⁷

Table 1: Estimated annual health impacts associated with U. S. Steel facilities

Health Impact	U. S. Steel (3 plants total)	Gary Works	Mon Valley Works (Clairton)	Mon Valley Works (Edgar Thomson)
Premature Deaths	105-202	57-114	37-66	11-22
ER Visits, Respiratory	99	48	41	10
Asthma Symptoms	55,417	31,858	18,664	4,895
Work Loss Days	10,138	6,353	2,730	1,055
School Loss Days	11,745	5,204	5,786	755

Source: Based on [Industrious Labs' modelling](#) using 2020 EPA National Emissions Inventory data (latest available year). Gary: p.33; Mon Valley: p.37.

At the press conference announcing the completion of the acquisition in June 2025, Nippon Steel stated that its efforts to steadily build dialogue with local communities had helped secure approval for the deal.³⁸ However, according to the Gary Advocates for Responsible Development (GARD), when Nippon Steel representatives visited the city prior to the acquisition, **a meeting arranged by the mayor lasted only about 10 minutes, leaving local stakeholders with the impression that the company was not prepared to engage meaningfully with the impacted communities about its future plans.**³⁹ GARD also stated that it sent a letter to Nippon Steel's headquarters in March 2026 requesting dialogue, but no response had been confirmed.

Now approaching one year since the deal's completion, Nippon Steel faces growing criticism that it has not only ignored communities, but is actively choosing a coal-based production future that will lead to declining jobs, continued health problems for people surrounding plants and worse climate impacts.

To establish itself as a global leader, the company will need to present a clear long-term vision for decarbonisation, improving health and employment outcomes, and to actually engage with local communities so they are part of a just transition process to green steel production.

32 [CBS](#), *Nippon Steel plans for Gary, Indiana steel plant won't stop coal use, despite community pressure*, 18 February 2026.

33 [Reuters](#), *Explosions at US Steel plant leaves two dead, 10 injured*, 12 August 2025.

34 U.S. Steel has paid over USD 64 million in air pollution enforcement actions, fines, and settlements related to the Mon Valley Works's three facilities since January of 2020, about USD 900,000 per month on average for the past six and a half years ([Allegheny County](#)).

35 [Industrious Labs](#), *New Report Unveils Alarming Health Costs of U.S. Coal-Based Steelmaking*, 21 October 2024.

36 [Mighty Earth](#), *U.S. auto industry's links to pollution and disease in steel communities*, 22 January 2026.

37 [Industrious Labs](#), *Dirty Steel, Dangerous Air*, October 2024.

38 [Nikkei](#), *Nippon Steel Chairman Hashimoto: "We will regain our position in the world once again" through the acquisition of U.S. Steel*, 19 June 2025.

39 Discussion between SteelWatch and [GARD](#).

'EAF first' transition in Japan

At home in Japan, the company has confirmed investment in three EAFs by 2029, with a strong emphasis on recycled steel scrap as a core part of the company's iron sourcing strategy.

These projects reflect a shift in Nippon Steel's medium-term domestic production plans away from its current nearly complete reliance on blast furnaces. However, the contribution of EAFs to decarbonisation depends critically on the sourcing of low-emissions iron inputs. In this context, as domestic scrap supply is both limited in volume and variable in quality, securing sufficient iron inputs becomes increasingly important. The iron inputs for EAFs are discussed in detail in [Chapter 3, Issue 1](#).

This section outlines the EAF investment plan and examines how it is positioned in terms of scale within the company's overall production capacity.

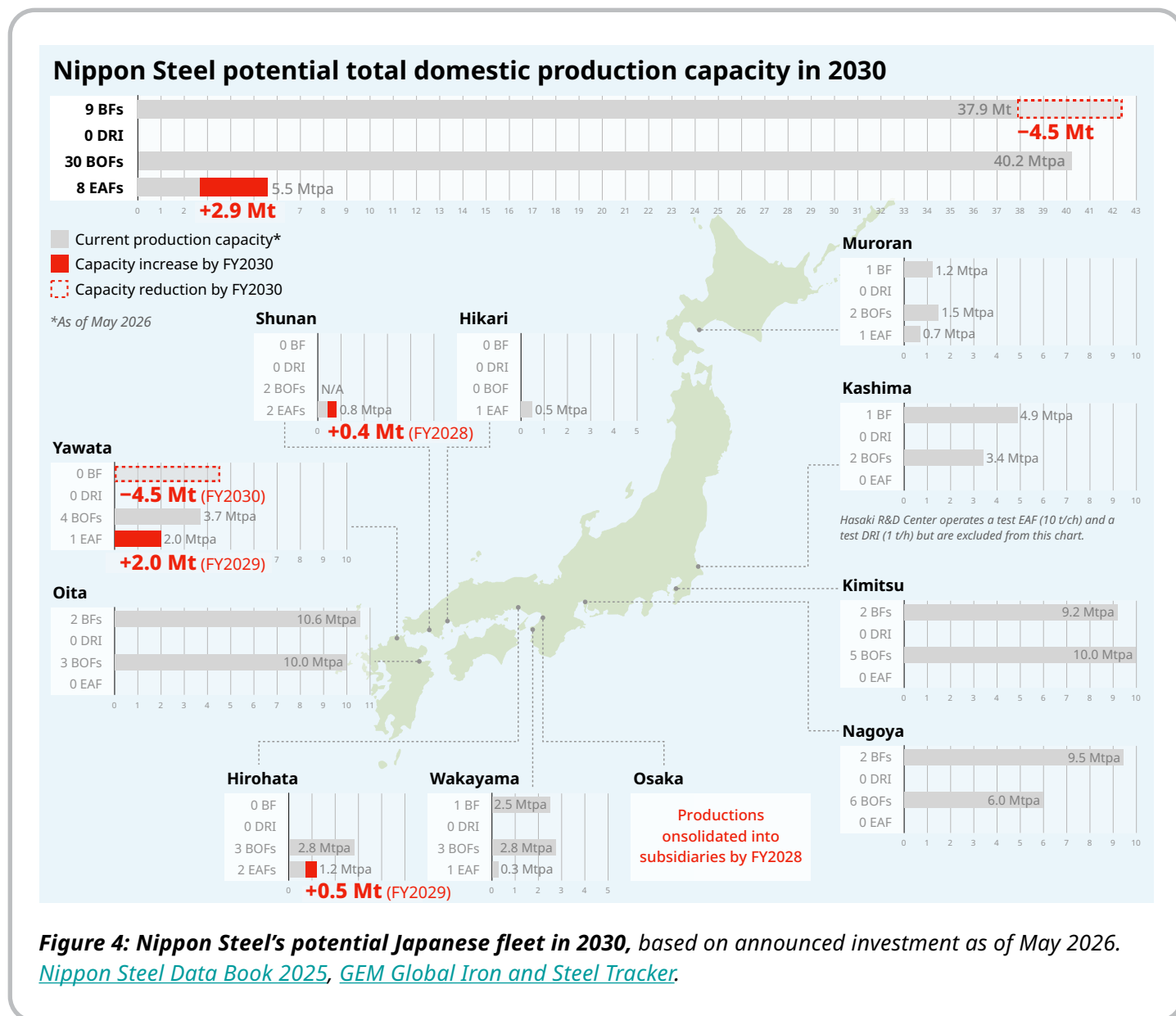


Figure 4: Nippon Steel's potential Japanese fleet in 2030, based on announced investment as of May 2026.
[Nippon Steel Data Book 2025](#), [GEM Global Iron and Steel Tracker](#).



Nippon Steel's Kyushu Works, Yawata Area.
SteelWatch, March 2026.

The company's transition plan of the Yawata Steel Works, established in 1901 as Japan's first integrated steelworks, is a crucial part of this 'EAF first' approach. The centrepiece of this initiative is the construction of a new EAF with 300 t per charge capacity,⁴⁰ designed to reach an annual production capacity of 2 Mt by FY2029. The construction officially began on 15 April 2026,⁴¹ on the site of the former Blast Furnace No.1 (idled in 1998). In parallel, Blast Furnace No.4, which is the only remaining blast furnace at Yawata, is scheduled for closure by FY2030.

This site-specific transition is also being complemented by the expansion of EAF capacity at the Setouchi Works (Hirohata Area) and the Yamaguchi Works (Shunan Area). Collectively, these three projects aim to increase the company's EAF capacity by 2.9 Mtpa, costing JPY 868.7 billion (USD 5.5 billion) investment, with approximately 30% (up to JPY 251.4 billion [USD 1.6 billion]) supported by Japanese government subsidies.

Through the planned retirement of the Yawata's blast furnace and the parallel installation of these additional EAF facilities, Nippon Steel expects⁴² to reduce annual operational emissions by up to 3.7 MtCO₂ from 2030 onwards. While commendable, this would correspond to a 4.9% total emissions reduction by 2030 (see [Chapter 2](#)). This is also the only near term emissions reduction measure for Nippon Steel that is both clearly quantified and backed by committed capital investment.

These projects signal a beginning of a shift in Nippon Steel's medium-term domestic production structure, with some potential for emissions reductions from 2030 onward. However, as shown in Figure 4, the initiatives remain limited, in absence of a strategy to shift ironmaking capacity and phase out the remaining blast furnaces.

The company's materials refer to the installation of a "reduced iron yard" at Yawata⁴³ and the consideration of procuring direct reduced iron from overseas as part of its cold iron source strategy,⁴⁴ but the details of this procurement strategy have not yet been publicly disclosed.

40 "Tonnes per charge" refers to the amount of material processed in one EAF charging cycle.

41 [SteelWatch](#), *Walking Yawata, the "Steel Town" Today: What Does Nippon Steel's New EAF Mean*, 22 April 2026.

42 Nippon Steel Group's reported emissions for FY2024 totalled 74.8 MtCO₂ (see [Chapter 2](#)). [Nippon Steel](#), *Nippon Steel's GX Initiatives*, p.19, 14 May 2026.

43 [Nippon Steel](#), *Nippon Steel's GX Initiatives*, p.21, 14 May 2026.

44 [Nippon Steel](#), *Nippon Steel's GX Initiatives*, p.28, 14 May 2026.

2. Assessment of Nippon Steel's climate targets

Assessing Nippon Steel's climate performance requires looking beyond the existence of targets to examine whether the company is on track to deliver emissions reductions at the pace and scale required.

This chapter assesses Nippon Steel's performance and highlights three key gaps: 1) between Nippon Steel's performance and the trajectory implied by Japan's climate targets; 2) between reported emissions and those associated with its joint ventures; and, most significantly, 3) the expanding gap created by the acquisition of U. S. Steel.

Meagre climate progress

Nippon Steel has adopted a 2050 Net Zero target, as well as an interim target to reduce its CO2 emissions by 30% by 2030 (compared with the 2013 benchmark). Announced in 2021, no additional interim targets have been set over the past five years.

According to the Integrated Report 2025,⁴⁵ Nippon Steel Group⁴⁶ emissions in 2013 across its domestic production facilities and subsidiaries amounted to 102 MtCO₂, implying a 2030 target of 71 MtCO₂.⁴⁷ For FY2024, reported emissions totalled 74.8 MtCO₂.⁴⁸ Additionally, the company reported 0.8 MtCO₂ due to its overseas subsidiaries⁴⁹ in India, Thailand, the EU and the US. This put the company's collective CO₂ emissions at 75.6 MtCO₂ (excluding U. S. Steel).⁵⁰

Table 2: Emissions and reduction targets of Nippon Steel and its subsidiaries

Company	Country	FY 2024 CO2 emission	Mid-term target	Long-term target
Domestic		74.8 Mtpa		
Nippon Steel	Japan	72.6 Mtpa	30% reduction by 2030 (2013 level)	Carbon Neutral by 2050
Subsidiaries	Japan	2.2 Mtpa		
Overseas		0.8 Mtpa		
OVAKO	Sweden Finland	0.1 Mtpa	80% reduction by 2030 (2015 level)	90% reduction by 2040 (2015 level)
SSMI	India	0.1 Mtpa	40% reduction by 2030 (2016 level)	Carbon Neutral by 2050
G/GJ Steel	Thailand	0.5 Mtpa	-	-
Standard Steel	US	0.1 Mtpa	-	-
Total		75.6 Mtpa		

Note: U. S. Steel and AM/NS India are excluded.

45 [Nippon Steel](#), *Nippon Steel Integrated Report 2025*, p.49, 2 October 2025.

46 Nippon Steel Group includes Nippon Steel Corporate and its subsidiaries (Osaka Steel, Sanyo Special Steel, Nippon Steel Stainless Steel, Oji Steel, Tokai Special Steel, Nippon Steel Structural Shapes Corporation, Tokyo Kohtetsu, Ovako, Sanyo Special Steel Manufacturing India, and Standard Steel), and three Sanso Center companies.

47 [Nippon Steel](#), *Nippon Steel Integrated Report 2025*, p.37, 2 October 2025.

48 NS Stainless Steel, Nippon Steel Structural Shapes, Sanyo Special Steel, Osaka Steel, Tokyo Kohtetsu, Oji Steel.

49 Ovako, Sanyo Special Steel Manufacturing India, G/GJ Steel and Standard Steel.

50 Integrated Report 2025 is based on FY2024 data and therefore does not include U. S. Steel, which was acquired in June 2025.

Between 2013 and 2024, Nippon Steel Group⁵¹ has averaged an emissions reduction rate of just under 2.7% per annum (Figure 5). However, this decadal shift obscures the reality of recent emissions levels, which have barely budged since 2020. Between 2020 and 2024, emissions have only declined by less than 2% (-0.46% per annum). If this recent decline rate continues, Nippon Steel Group would only be expected to reduce its 2013 emissions levels by 34% by 2050 (Figure 6). This highlights the considerable need to rapidly accelerate emissions reductions.

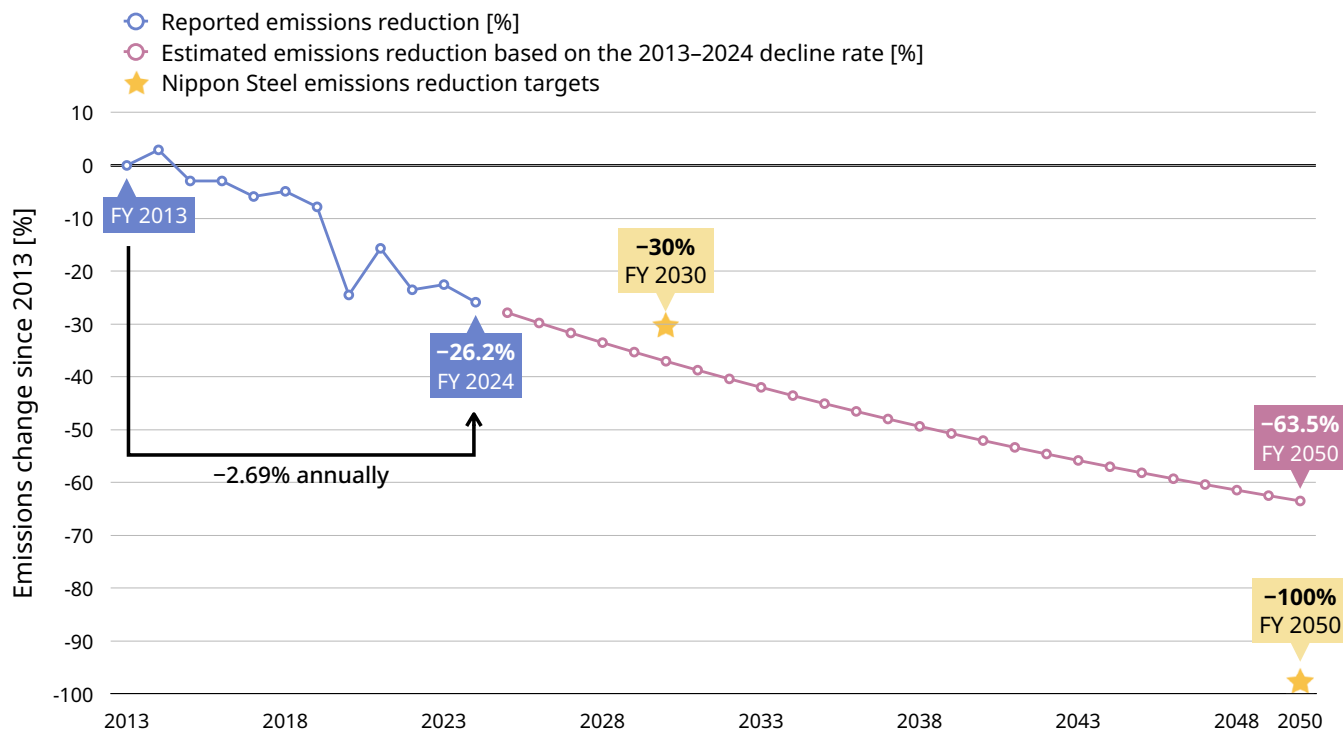


Figure 5: Estimated emissions of the Nippon Steel Group based on the reduction trend from 2013 to 2024

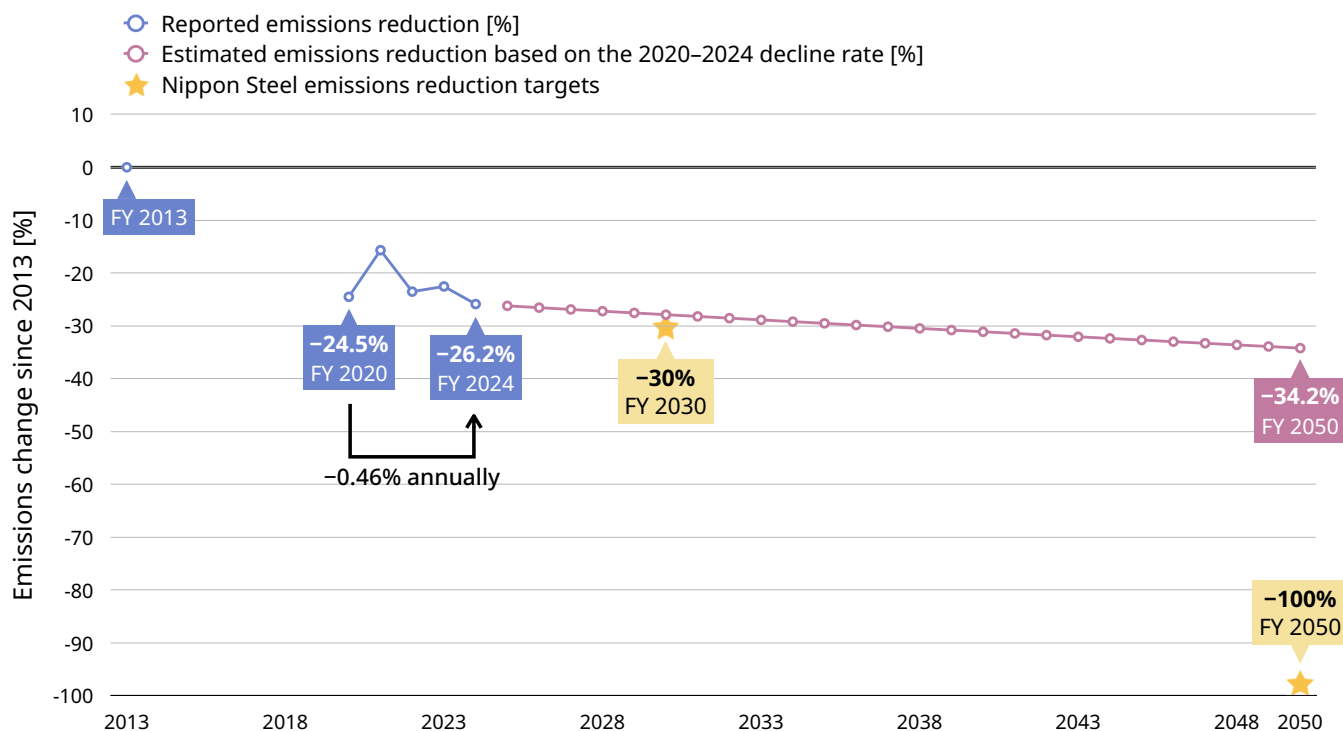


Figure 6: Estimated emissions of the Nippon Steel Group based on the reduction trend from 2020 to 2024

⁵¹ Refer to footnote 46 on what is contained in Nippon Steel Group.

Gap with national targets

In February 2025, the Japanese government submitted an updated Nationally Determined Contribution (NDC) under the Paris Agreement to the United Nations, setting new targets to reduce GHG emissions by 60% by FY2035 and by 73% by FY2040, compared with its FY2013 benchmark.⁵² These targets are operationalised through the government's "Plan for Global Warming Countermeasures," which outlines sectoral emissions reduction benchmarks and positions voluntary action plans by individual industries as key implementation mechanisms.⁵³

In this short section, we seek to highlight Japan's emission reduction progress to date, and assess the necessary rate changes needed to achieve these longer term goals.

Japan's total domestic emissions declined from 1,394 MtCO₂e in 2013 to 994 MtCO₂e in 2024, representing a reduction of approximately 29%.⁵⁴ Throughout this period, annual emissions have reduced at an average annual rate of 3.0% per year.

This is a commendable rate of change. However, if reductions continue at a similar pace until 2030, the government would likely reach an overall emissions reduction of 41% compared to 2013, just below their stated target of 46%. This gap would then widen significantly towards 2035 and 2040, unless additional emissions reductions were unlocked.

A similar trend can be observed in the industrial sector, where emissions have declined by approximately 28% between 2013 and 2024 (approx. -3.0% per annum). This is in line with the sectorally-specific target outlined in the "Plan for Global Warming Countermeasures," which tasked the industrial sector with achieving an overall emissions reduction of 38% by 2030.⁵⁵

Throughout this time, Nippon Steel's emissions reductions have remained broadly in line with the national average, as outlined in the previous section (see Figure 7). However, recent trends highlight that Nippon Steel's emission reduction rate has fallen well behind that required (see Figure 8). Beyond 2030, national emissions reduction targets become substantially more stringent, requiring a considerably accelerated emission reduction rate.

When considering that much of the company's historical emissions reductions have been associated with declines in production volumes, Nippon Steel now needs to not only reverse its deceleration in emissions reductions, but unlock considerable medium term decarbonisation opportunities, in order to re-align with national emission reduction targets.



Blast furnace slag and pig iron tapping.
Licensed stock photo

52 [Ministry of the Environment](#), *Japan's NDC (Nationally Determined Contribution)*, 18 February 2025.

53 [Ministry of the Environment](#), *Plan for Global Warming Countermeasures (approved by the Cabinet on 18 February 2025)*, Retrieved 1 May 2026.

54 It should be noted that Japan is relatively unique in setting a 2013 baseline level, following the 3/11 disaster. Many other countries have set emissions reduction baselines much earlier, including Taiwan, Brazil, Canada and Australia (2005) and the EU (1990). Compared to 1990 levels, Japan's cumulative emissions reduction would have achieved a 14% reduction to date.

55 [Ministry of the Environment](#), *(Related Material 1) Targets by greenhouse gas type and other categories for FY2030 and FY2040, and indicative sectoral emissions levels for energy-related CO₂ emissions*, Retrieved 1 May 2026.

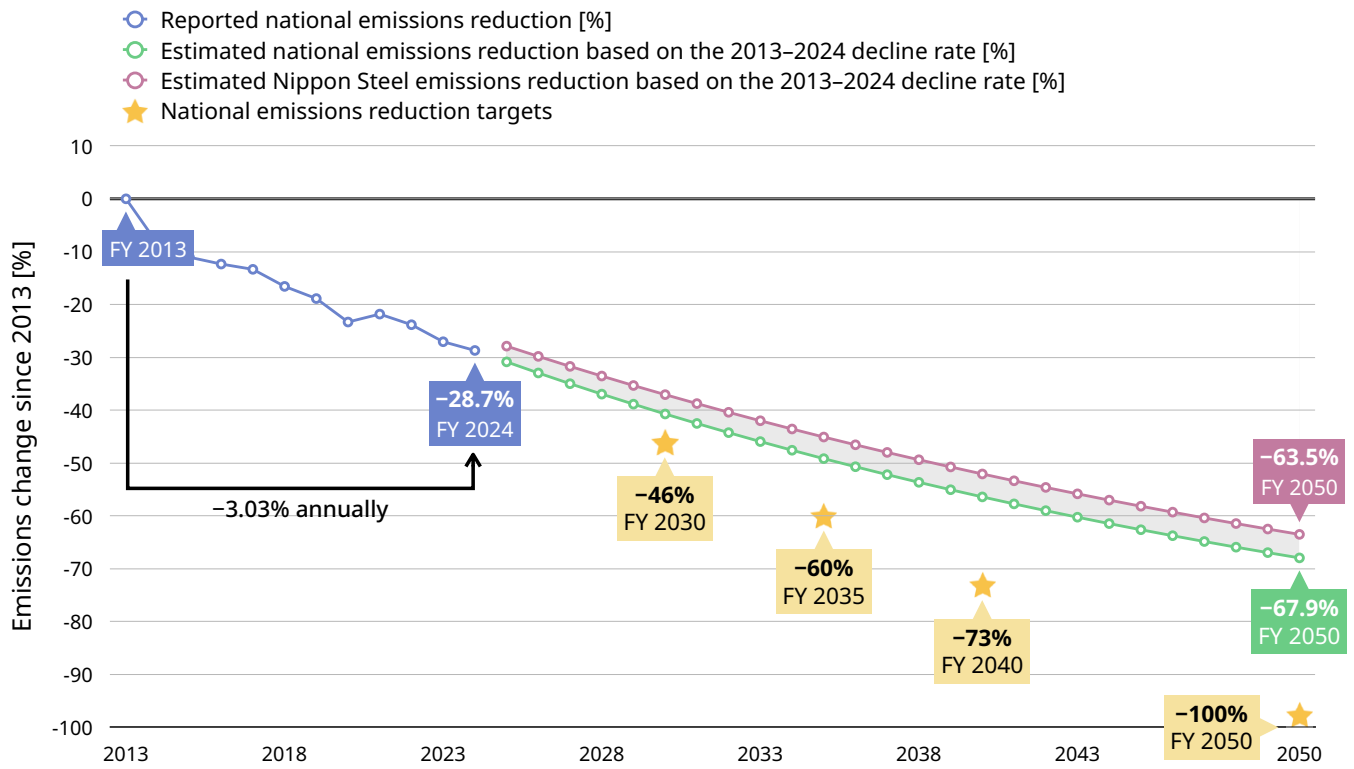


Figure 7: Comparative emission reduction rates from 2013-2024 and forward projections. Over the last decade, Nippon Steel has largely reduced its emissions in line with national emissions reductions.

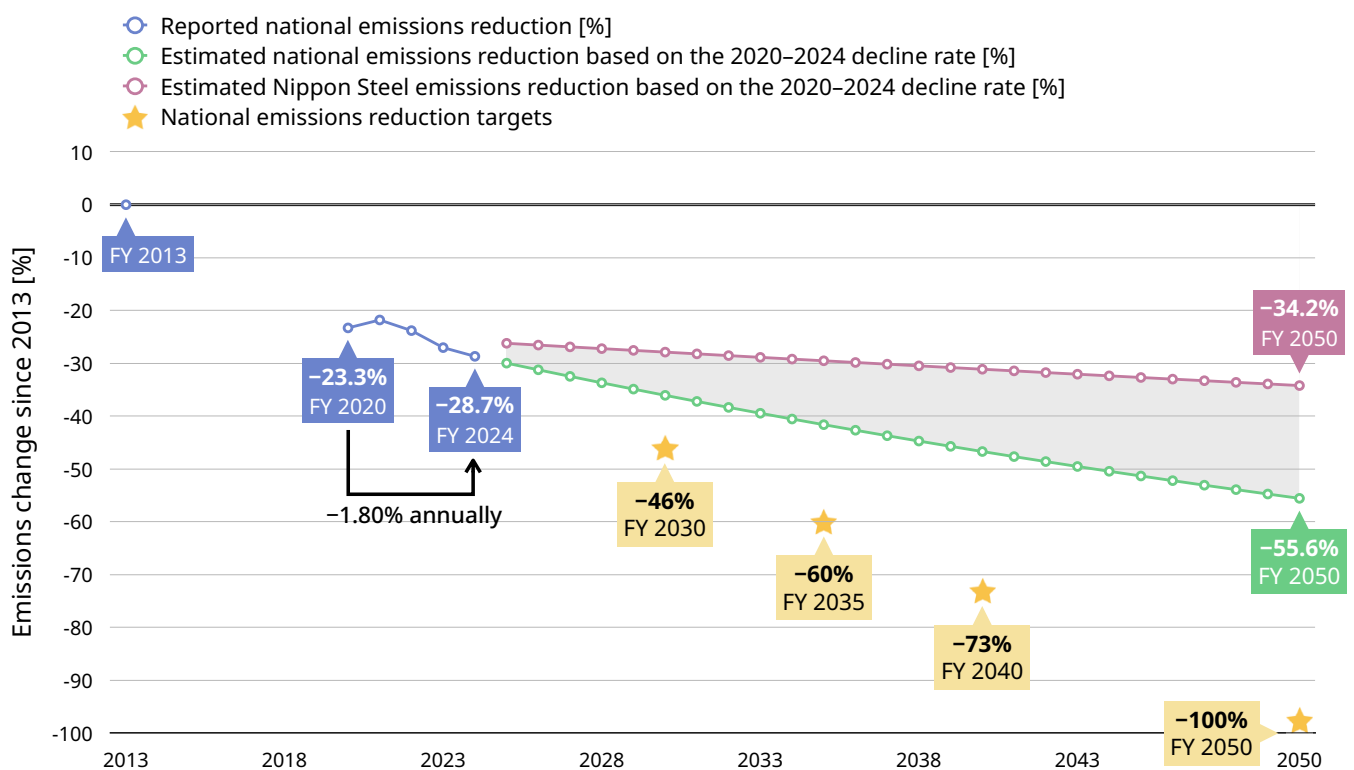


Figure 8: Comparative emission reduction rates from 2020-2024 and forward projections. Since 2020, emissions reduction rates have diverged, and Nippon Steel is well behind the pace of change it needs to align with National emission reduction goals.

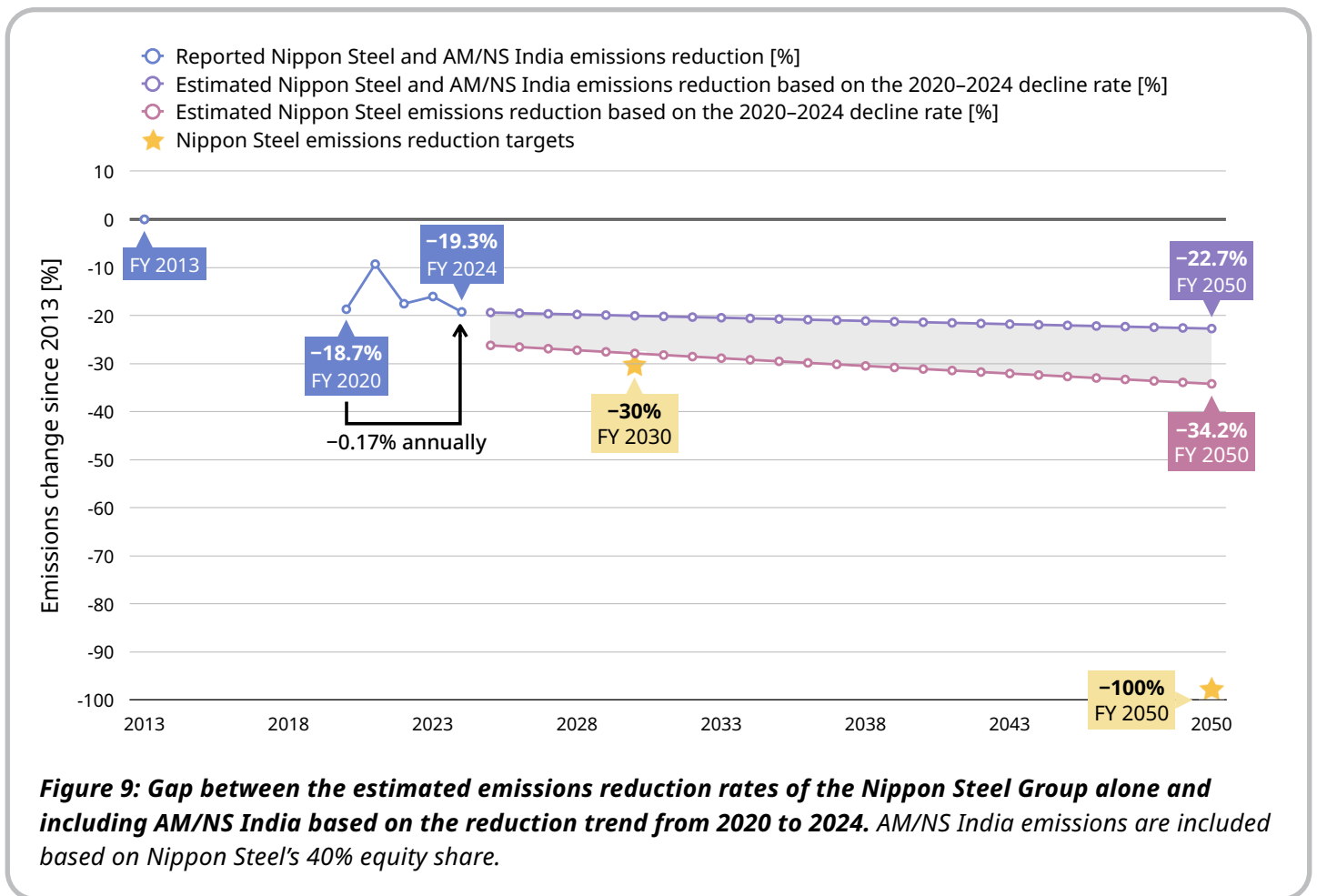
Gap with joint ventures

While Nippon Steel positions “Driving significant profit growth through execution of the global growth strategy”⁵⁶ at the core of its corporate strategy, it does not fully capture its global footprint. In particular, emissions from joint ventures in India are not currently included on an equity share basis.⁵⁷

ArcelorMittal Nippon Steel India (AM/NS India), established in December 2019, is a joint venture where Nippon Steel has a 40% stake and has the highest emissions intensity among its overseas operations.⁵⁸ AM/NS India is also pursuing aggressive blast furnace expansion plans, and with 65% of its current capital expenditure linked to high carbon assets, emissions are likely to continue rising in the coming years.⁵⁹

If this joint venture were included, Nippon Steel would no longer be on track to meet its 2030 targets.

Including Nippon Steel's equity share basis emissions from AM/NS India would reduce the company's average annual emissions reduction rate between 2020 and 2024 to just 0.17%, indicating that emissions reductions have been extremely limited over this period.⁶⁰ This highlights a significant disconnect between the business areas where Nippon Steel is actively pursuing growth and the emissions responsibility reflected in its public reporting.



56 [Nippon Steel](#), *Nippon Steel 2030 Medium- to Long-term Management Plan*, 12 December 2025.

57 As Nippon Steel announced the sale of its stake in Usiminas (Brazil) and withdrew from Brazil in November 2025, Usiminas is excluded from the analysis in this report.

58 [ArcelorMittal Nippon Steel India](#), *Sustainability Report 2024-25*, Retrieved 1 May 2026.

59 [Carbon Tracker Initiative](#), *Measuring Transition: AMNS*, 23 September 2025.

60 Emissions reported in [AM/NS India's Sustainability Reports](#) were calculated based on Nippon Steel's equity share (40%) and added to the emissions reported in [Nippon Steel's Integrated Reports](#). It should be noted that, as the reporting entities differ, the reporting boundaries may not necessarily be fully aligned.

Even greater gap with U. S. Steel

The gap becomes even more pronounced when considering the acquisition of U. S. Steel. Until now, the company may have faced certain limitations in directly developing and implementing decarbonisation strategies for some overseas operations where it was not the controlling shareholder. However, unlike AM/NS India, U. S. Steel is a wholly-owned subsidiary of Nippon Steel. As such, Nippon Steel now holds direct responsibility for U. S. Steel's emissions and climate strategy.

Nippon Steel explains its approach to U. S. Steel's emissions reductions as involving "targets set individually by country and/or company in recognition of different conditions in each country/region and the varying national reduction targets and transition strategies."⁶¹ **While differing business and policy conditions may justify variations in mid-term targets, a company holding responsibility in global expansion of both its business and emissions, should clearly communicate group-wide decarbonisation progress and ensure that its investment plans align with that transition pathway.**

U. S. Steel had previously set a target to reduce its emissions intensity by 20% by 2030 compared with 2018 levels (announced in 2019), as well as a net zero target for 2050 (announced in 2021).⁶²

While the emissions intensity of Nippon Steel's domestic operations remained broadly unchanged (from 1.89 tCO₂/ts in 2018 to 2.22 tCO₂/ts in 2024), U. S. Steel has shown some progress toward its emissions intensity reduction target (from 1.80 tCO₂/ts in 2018 to 2.22 tCO₂/ts in 2024). These reductions have been heavily influenced by changes in the production mix. The production increase and emission intensity decrease in 2021 was primarily driven by a shift in U. S. Steel's production mix toward EAF-based steelmaking, particularly following the acquisition of Big River Steel, which has significantly lower emissions compared to traditional blast furnace operations.

Overall however, similar to Nippon Steel's challenges, U. S. Steel's emissions have largely remained static since 2020, and plans to restart an idled blast furnace at Granite City Works will likely lead to an increase in emissions.

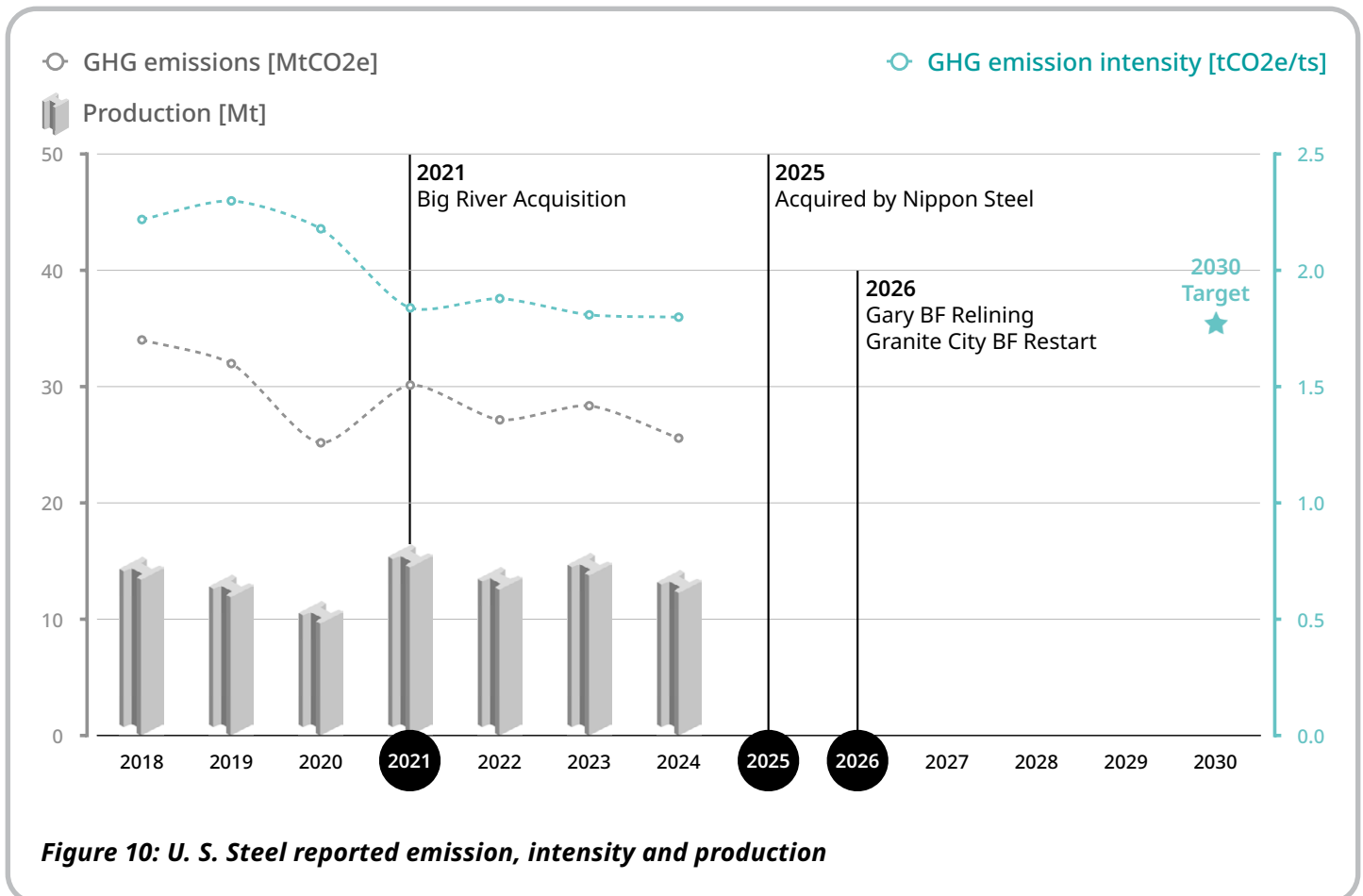


Figure 10: U. S. Steel reported emission, intensity and production

61 Nippon Steel, Nippon Steel's GX Initiatives, p.67, 24 March 2026.

62 U. S. Steel, Roadmap to 2050, Retrieved 1 May 2026.



U. S. Steel Gary Works in Indiana.
SteelWatch, Gary, November 2025.

Emissions associated with its joint ventures and the newly acquired U. S. Steel overseas may further hinder progress in accelerating this trajectory at the corporate level.

Despite the need for significantly accelerated emissions reductions, as noted in [Chapter 1](#), further reduction plans remain limited. While a large-scale EAF is planned to be operational around 2030 in Japan, there are no further announcements on blast furnace phase-outs.

The company plans to reduce emissions from existing blast furnaces through so-called “hydrogen injection into blast furnaces.”⁶³ However, these technologies are not expected to be established until around 2040, with commercial deployment projected by 2050, indicating that their contribution to near-term emissions reductions will be limited (see [Chapter 3, Issue 3](#) for further details).

Emissions associated with its joint ventures and the newly acquired U. S. Steel overseas may further hinder progress in accelerating this trajectory at the corporate level.

63 [Nippon Steel](#), *Nippon Steel 2030 Medium- to Long-term Management Plan*, p.34, 12 December 2025.

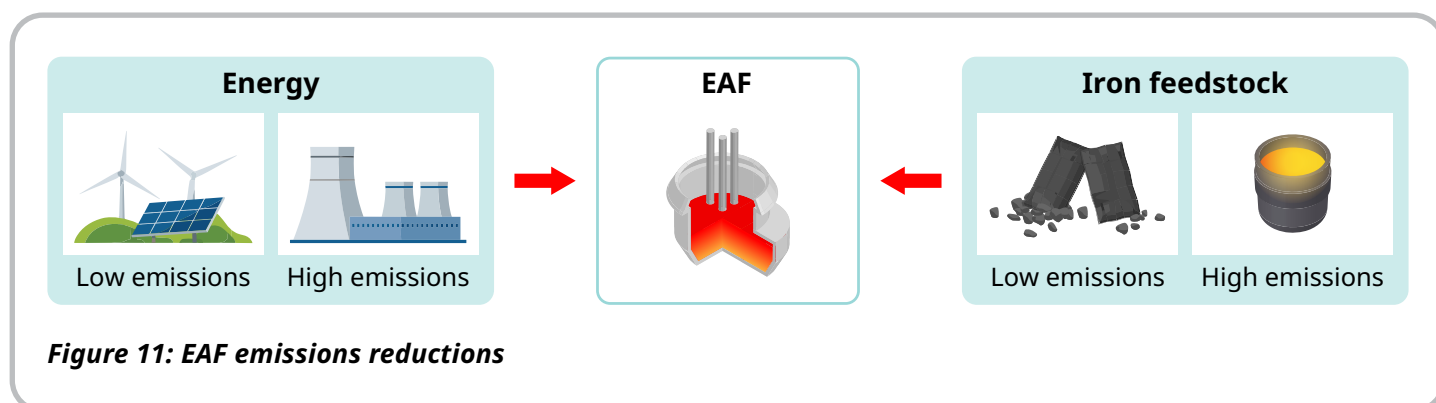
3. Assessment of technological choices

Nippon Steel is pursuing a “multipathway roadmap” to achieve carbon neutrality, centered on three key, and in some cases, experimental technologies: high-grade steel production through large-scale EAFs, hydrogen-based DRI with low-grade iron ore, and hydrogen injection into blast furnaces with carbon capture (COURSE50 and Super COURSE50). This approach appears pragmatic on the surface, but the company has yet to present a clear mid-term pathway showing how these technologies will deliver emissions reductions. As a result, investments that rely on the continued operation of coal-based blast furnaces are also being maintained despite their limited decarbonisation potential.

Following the U. S. Steel acquisition and consolidating its flagship overseas expansion, Nippon Steel announced a “2030 Medium- to Long-Term Management Plan” in December 2025.⁶⁴ The plan emphasises efforts on both “breakthrough technologies” and “market creation” and identifies “large-scale EAFs,” “GX Steel,” and “hydrogen-based ironmaking” as main initiatives. This management plan does not represent a fundamental shift, nor does it address “the empty decade” — the lack of emissions reduction projects in the 2030s — identified in SteelWatch’s report in 2025.⁶⁵ The science of climate change makes it clear that earlier CO₂ reductions are profoundly better, as they reduce the cost, complexity and risks that come with later cuts.⁶⁶ This chapter examines Nippon Steel’s key decarbonisation initiatives, structured around four core issues, and assesses both their scope and the key challenges.

Issue 1: Electricity source and iron inputs for new EAFs

In May 2025, Nippon Steel announced investment plans for EAFs at three sites, Yawata, Hirohata and Shunan, with production scheduled to begin between the second half of FY2028 and the second half of FY2029.⁶⁷ However, realising the decarbonisation benefits of EAFs will require a comprehensive approach. This includes clearly demonstrating how both electricity supply and iron inputs will align with long-term climate targets.



Emissions from electricity sources

The company announced the construction of fossil gas-fired power plants to power the new Yawata EAF.⁶⁸ Historically, the Yawata Area generated electricity using off-gases from the coal-based blast furnace and coke oven. These gases were used as fuel at the Tobata Joint Power Plant,⁶⁹ and part of the generated electricity was consumed within the steelworks itself.⁷⁰ However, once coal-based blast furnace operations are retired, these off-gases will no longer be available as fuel.

64 [Nippon Steel](#), *Nippon Steel 2030 Medium- to Long-term Management Plan*, p.34, 12 December 2025.

65 [SteelWatch](#), *No Time For Caution: Nippon Steel Corporate Climate Assessment 2025 update*, 7 May 2025.

66 Sanderson, B.M., O’Neill, B.C. Assessing the costs of historical inaction on climate change. *Sci Rep* 10, 9173 (2020). <https://doi.org/10.1038/s41598-020-66275-4>

67 [Nippon Steel](#), *Decision is Made to Invest in the Conversion from the Blast Furnace Steelmaking Process to the Electric Arc Furnace Steelmaking Process*, 30 May 2025.

68 [Nippon Steel](#), *Outline of the Environmental Impact Assessment Method Statement*, November 2025.

69 [Kyushu Co-operative Power Company](#), *Characteristics of the Tobata Joint Power Plant*, Retrieved 1 May 2026.

70 The use of off-gases has long been a common practice not only at Yawata, but across integrated BF-BOF steelworks in general.

Nippon Steel plans to construct new LNG-fired power generation facilities at Yawata, with a total capacity of around 2000 MW (four 500 MW units)⁷¹. This runs counter to Japan's commitment to reaching a "fully or predominantly decarbonised power system by 2035" as part of the G7. Any newly constructed power facilities must be evaluated against this commitment.

Emissions from iron feedstock

As EAF capacity expands, securing sufficient iron inputs also becomes increasingly important. In April 2026, the Japanese government introduced the "Metal Recycling Promotion Strategy"⁷² to strengthen the supply capacity of high-quality scrap. However, the availability of scrap means there are inherent limits to expanding EAF production based solely on scrap.

In addition, the use of scrap faces technical challenges. Since 2024, Nippon Steel has been developing technologies such as dephosphorisation and denitrification at its Hasaki R&D Center, using a 10 tonne test EAF to support high-grade steel production. These impurity removal technologies are being developed with the aim of future integration into large-scale EAFs.⁷³

EAFs are commonly associated with scrap recycling, but they can run on a range of iron inputs: scrap, direct reduced iron, or pig iron from blast furnaces. In practice, many EAFs will blend these inputs to meet different customer demands. However, the trade-off is that a higher share of pig iron raises an EAF's overall emissions.

EAFs in Nippon Steel's overseas operations

In Nippon Steel's domestic operations, investment in large-scale EAF production is still at an early stage. In contrast, a range of EAF operations have already been commercialised across its overseas portfolio. While the emissions intensities of this steel production can vary significantly between projects, overall EAFs achieve a far lower emissions intensity than traditional BF-BOF steelmaking. However, the use of larger shares of pig iron from coal-based blast furnaces limit these emissions reduction benefits.

For example, at the U. S. Steel Big River plant, two EAFs operate with 57.3% recycled steel scrap and the remainder supplied by pig iron, resulting in reported emissions of 1.34 tCO₂e per tonne of crude steel.⁷⁴ This is significantly higher than for average scrap-based EAF steel (0.68 tCO₂ per tonne of crude steel).⁷⁵

In contrast, Ovako (Sweden), which is planned to be a directly owned subsidiary of Nippon Steel by 2027, operates EAFs using 97% scrap together with fossil-free electricity (hydro, wind, nuclear), and has reported emissions intensities as low as 0.09 tCO₂ per tonne.⁷⁶ Its decarbonisation profile is further strengthened by the use of renewable energy powered hydrogen in its rolling processes and generated on-site via electrolysis. In contrast to Nippon Steel's broader challenges of acquiring high quality steel and expanding green hydrogen, Ovako is pursuing rapid emissions reductions through scrap- and electricity-based steel system with hydrogen.

In Thailand, G Steel (two EAFs) and GJ Steel (one EAF) use a mix of 90% scrap and 10% pig iron. Nippon Steel has also announced a strategic partnership with Thailand aimed at strengthening domestic scrap recycling.⁷⁷ However, Thailand's relatively carbon-intensive power grid is likely to result in comparatively higher emissions intensities.⁷⁸

These examples across the US, Sweden and Thailand not only highlight how emissions reductions through EAF are progressing across Nippon Steel's global operations, but also clearly juxtapose the limited shifts happening within its domestic operations. In particular, the emissions intensity through EAF production depends heavily on iron inputs. **Nippon Steel's EAF strategy must be accompanied by the decarbonisation of upstream ironmaking.**

71 [Nippon Steel](#), *Summary of the Environmental Impact Assessment Method Statement*, November 2025.

72 [Japan Metal Daily](#), *High-Grade Steel Scrap / Supply Expansion Target of '2 Million Tonnes' Officially Approved / Government Formulates Metal Recycling Promotion Strategy*, 22 April 2026.

73 [Nippon Steel](#), *Nippon Steel's GX Initiatives*, p.23, 14 May 2026.

74 [Responsible Steel](#), *Big River Steel LLC*, 9 August 2024.

75 [World Steel Association](#), *World Steel in Figures 2024*, Retrieved 1 May 2026.

76 [Transition Asia](#), *Nippon Steel's Internationalisation of Integrated Steel Operations: An analysis of EAF based steel*, 15 April 2024.

77 [The Nation](#), *Thai Government and Nippon Steel Join Forces to Forge a 'Green Industry'*, 19 May 2026.

78 Ibid.

Box 1: HBI imports

One option for securing low-emissions iron inputs in the future is to import iron produced via green hydrogen-based DRI (H₂-DRI) overseas. Iron produced through DRI has a highly porous structure, and when exposed to moisture, can reoxidise (rust) and result in quality degradation and heat generation. To address this, it is compressed and formed into hot briquetted iron (HBI), which enables safer handling, long-term storage, and transportation.



Figure 12: Direct reduced iron and hot briquetted iron

Traditionally, steel production has been carried out in integrated steelworks, where ironmaking and steelmaking take place at the same site. However, with HBI, these processes no longer need to be co-located. This enables ironmaking to occur in renewable energy hotspots while steelmaking can take place closer to the customers.⁷⁹

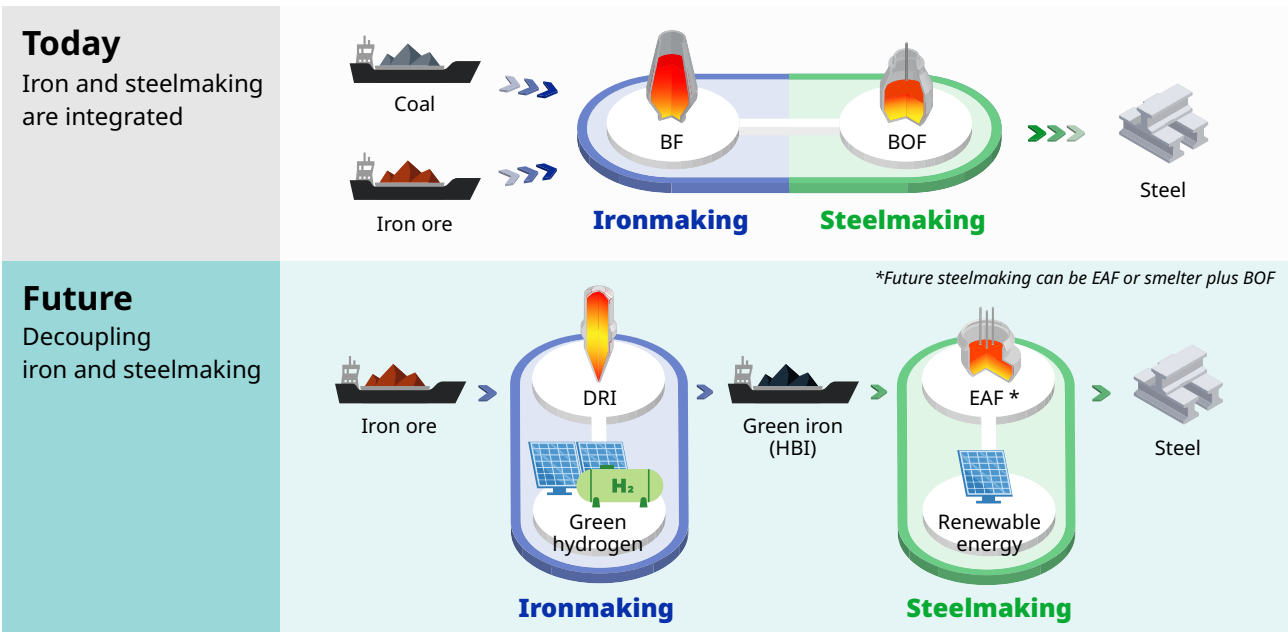


Figure 13: Green iron trade

79 Devlin, A., Kossen, J., Goldie-Jones, H. et al. Global green hydrogen-based steel opportunities surrounding high quality renewable energy and iron ore deposits. Nat Commun 14, 2578 (2023). <https://doi.org/10.1038/s41467-023-38123-2>

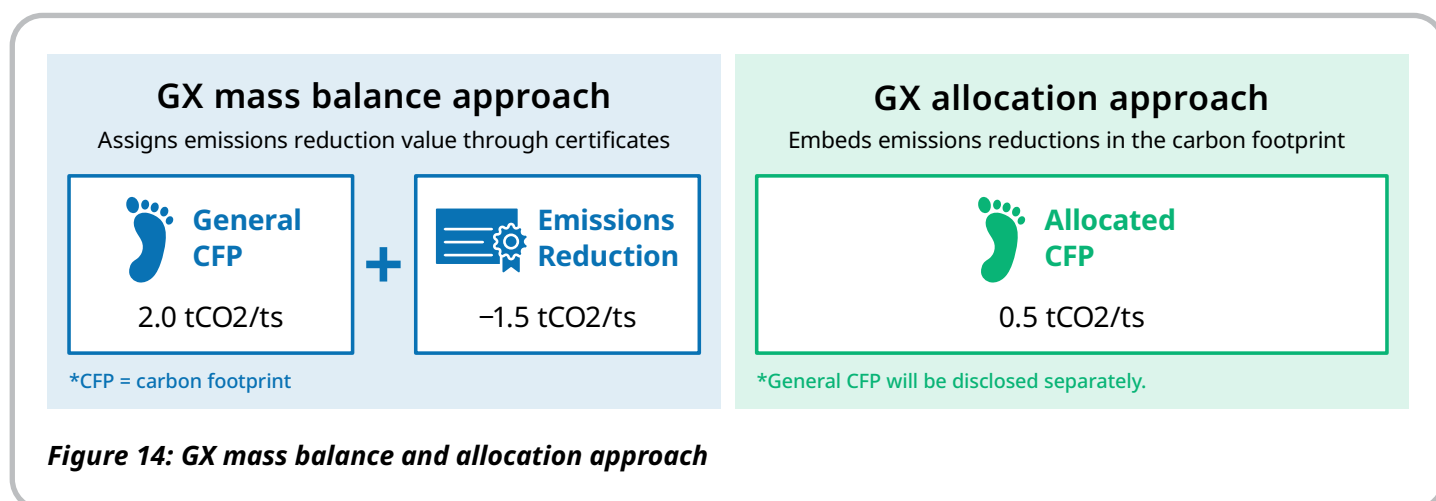
Issue 2: Green steel vs. GX Steel

In 2023, the Japan Iron and Steel Federation (JISF) established guidelines (“JISF mass balance”),⁸⁰ under which emissions reductions are pooled within a company and allocated as certificates to specific products, allowing coal-based steel to be labelled as “green” steel.

The JISF approach lacks a substantive physical connection between emissions reductions and the steel products to which those reductions are allocated⁸¹ and emissions reductions are determined relative to a baseline of the company’s choosing.⁸² **Steel produced in highly carbon-intensive coal-based blast furnaces could be deceptively sold as having zero emissions under the JISF guidelines.**

JISF’s approach has faced growing criticism both domestically and internationally for potentially misleading buyers about the green attributes of these products. In June 2025, 30 civil society organisations issued an open letter opposing recognition of the JISF approach in international standards.⁸³ In October 2025, JISF published the “GX Steel Guidelines,”⁸⁴ rebranding “green steel” as “GX Steel,” and introducing a new “GX Allocation method.” While the previous “GX mass balance method” assigned emissions reduction value through certificates, the “GX allocation method” directly embeds corporate-level emissions reductions into the carbon footprint calculation (CFP) for a steel product.

However, both approaches still allocate company-wide emissions reductions to products that may have been produced through carbon-intensive blast furnace processes, meaning the underlying mechanism and its flaws remained largely unchanged.



At the same time, the Japanese government is promoting demand creation for GX Steel by incorporating the JISF framework into measures such as public procurement and EV subsidies. In March 2026, green steel (including GX Steel) was also designated as a priority area under Japan’s Growth Strategy, with a target to establish a market of over 3 Mtpa in the early 2030s.⁸⁵

The key question is whether GX Steel is a transitional measure with clear time bounds and is defined as distinctly separate from deeply decarbonised steel to avoid confusion among potential buyers.

JISF positions GX Steel as a measure for the “decarbonisation transition period,” but has not clarified a specific timeline for ending the scheme. Continued reliance on such mechanisms into the 2030s risks delaying investment in deep emissions reduction technologies such as H₂-DRI, ultimately undermining the competitiveness of Japan’s steel industry.

80 [Japan Iron and Steel Federation](#), *Revision and Publication of the “Guidelines on Green Steel” Version 3.0*, Retrieved 1 May 2026.

81 Nippon Steel argues that a physical connection exists on the basis that slabs are transferred between production sites.

82 [Ministry of the Environment](#), *Environmental Restoration and Resource Circulation: Mass Balance Approach*, Retrieved 1 May 2026.

83 [SteelWatch](#), *Civil society organisations urge rejection of deceptive accounting schemes in steel standards*, 5 June 2025.

84 GX: Green Transformation

85 [Prime Minister’s Office of Japan](#), *Council for Japan’s Growth Strategy*, 10 March 2026.

Box 2: Global progress in the emerging value chain for transportable green iron

While GX Steel continues domestically, technological transitions that deliver deep emissions reductions are advancing globally.

In 2020, Hydrogen Breakthrough Ironmaking Technology (HYBRIT) opened its pilot plant in Luleå, Sweden, which enabled the project's participating steelmaker SSAB to produce the first steel using 100% fossil-free hydrogen in 2021. Since then, more than 5,000 tonnes of fossil-free hydrogen-based DRI has been produced at that plant, validating the technology on a semi-industrial scale.⁸⁶

Not far from Luleå, in Boden, the Swedish scale-up Stegra is advancing construction of a commercial-scale plant for producing 2.5 Mt of green hydrogen-based steel per year, with an expansion to 5 Mt per year foreseen by 2030. All 37 electrolyser modules for 740 MW of green hydrogen production are now in place.⁸⁷

It is not a coincidence that two pioneering green steel projects are located so closely to each other. Northern Sweden benefits from cheap renewable electricity, such as hydropower and wind power, a significant comparative advantage for producing green H₂-DRI⁸⁸ at a competitive cost.

Comparative advantages are already driving the shape of new value chains for transportable green iron. Investment in green hydrogen-based DRI is beginning to shift away from traditional steelmaking regions toward locations where the cost of producing greener iron is lower. For example, the international consortium HyIron produced its first green hydrogen-based DRI in Namibia in April 2026,⁸⁹ linking iron ore from Australia and Namibia's potentially abundant solar resources, with forthcoming transports to Germany. Similarly, DRI projects in the Middle East and North Africa (MENA) are expanding rapidly for both domestic and international demand with companies signing offtake agreements for HBI.^{90 91}

Some DRI projects, including in MENA, are initially operating on fossil gas while planning to blend increasing shares of green hydrogen as infrastructure grows and costs fall. The government in Oman has already set clear goals for this transition to truly green iron.

China has around 6 Mt of combined DRI capacity currently under development⁹². Most projects rely on coal-derived gases, but investment in renewable energy and green hydrogen is also growing. As renewable electricity prices fall in certain regions, Chinese ironmakers will have increasing opportunities to shift toward green hydrogen-based steelmaking.

As supply increases, transportable HBI may prove to be both a cost effective and climate efficient means of significantly reducing emissions from ironmaking, historically done in coal-based blast furnaces, across Nippon Steel's portfolio.⁹³

86 [Vattenfall](#), *HYBRIT – pioneering fossil-free steel production to cut industrial emissions at the root*, Retrieved 1 May 2026.

87 [Stegra](#), *Final electrolyzer module installed at Stegra's green hydrogen plant*, 2 April 2026

88 Johnson, C., Åhman, M., Nilsson, L.J. et al. Emerging green steel markets surrounding the EU emissions trading system and carbon border adjustment mechanism. *Nat Commun* 16, 9087 (2025). <https://doi.org/10.1038/s41467-025-64440-9>

89 [The Extractor Magazine](#), *SuSteelAG, HyIron and partners deliver N\$90m hydrogen breakthrough*, 13 April 2026.

90 [Meranti Green Steel](#), *Meranti Green Steel Announces Strategic Green Iron Project in Oman*, 11 August 2025.

91 [Danieli](#), *Jindal Steel orders second hydrogen-ready DRI plant in Oman*, 16 September 2025.

92 [Lead the Charge](#), *Automakers Drive China Green Steel Development*, 2 December 2025.

93 Several academic assessments highlight the future feasibility of green HBI imports, including [Devlin et al \(2022\)](#), [Cao et al \(2024\)](#) and [Zhengxi et al \(2025\)](#).

Box 3: Nippon Steel's DRI investment

Nippon Steel is advancing original research and development efforts in DRI production, with increasing signals that it is also exploring opportunities to procure and import HBI.

However, the R&D timeline is not in line with the pace required to meet the net-zero targets.

In March 2026, Nippon Steel began operating a test DRI with a capacity of 1 tonne per hour at its Hasaki R&D Center. The facility aims to produce hydrogen-based direct reduced iron from low-grade iron ore. The company plans to build and test a mid-scale demonstration furnace in the late 2020s, aiming to establish the technology by 2040 and achieve commercial deployment by 2050. Legacy steelmaking companies' transition plans from blast furnaces to hydrogen-based DRI, especially in Europe, have recently slowed down, but by years and not by decades. Nippon Steel's target for deployment in 2050 is exceedingly unambitious even in comparison.

While original research and development will take time, recent signals of increasing interest in securing HBI supply from overseas is worth noting. As discussed in [Chapter 1](#), Nippon Steel is planning to invest in building a new DRI at U. S. Steel's Big River, raising a possibility that HBI produced there could be exported to Japan.⁹⁴

In August 2025, Nippon Steel joined in a non-binding consortium that had identified the Whyalla Steelworks in South Australia as a "prospective location for future production of lower-emissions iron."⁹⁵ The other consortium members include BlueScope (Australian), Santos (Australia), JSW Steel (India) and POSCO (South Korea). The consortium is one of a number of active proposals aiming to transform the existing Whyalla steelworks into a site for future production of "lower-emissions iron," and has submitted a non-binding and indicative expression of interest to further develop the site.

In February 2026, the South Australian government further reinforced this potential after it committed⁹⁶ to support the expansion of magnetite mining at the Iron Duke site in the Middleback Ranges. The site could feed directly into the potential Whyalla steelworks in the future, and ensures the high quality iron ore supply critically needed for the steelworks to transition to DRI. But, at the moment, 'lower-emissions iron' appears to refer only to fossil gas-based DR iron, with the prospect of a transition to green hydrogen DRI diminishing. This risk of gas lock-in was confirmed when the South Australian state government committed to a 10-year gas supply agreement with Santos to supply the Whyalla steelworks. A final decision on who will be the plant's future operators and which production process will be implemented is expected later this year.



*Steelworks at Whyalla in South Australia
Licensed stock photo*

94 [Japan Metal Daily](#), *Nippon Steel / US Subsidiary U. S. Steel / EAF Subsidiary to Construct New DRI Plant / JPY 304 Billion Investment in 'Big River' with Annual Capacity of 2.5 Million Tonnes*, 1 May 2026.

95 [BlueScope](#), *BlueScope leads consortium for Whyalla options*, 4 August 2025.

96 [Ministers for the Department of Industry, Science and Resources](#), *Backing Whyalla's future as expansion points to industrial transformation*, 17 February 2026.

Issue 3: Preservation of existing coal-based assets

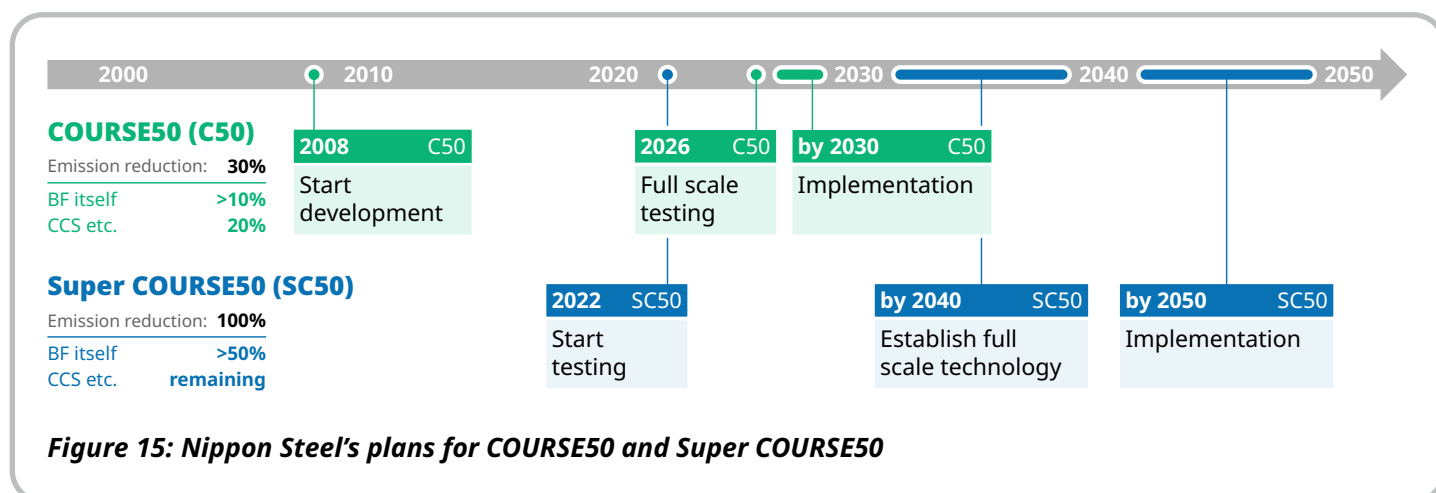
Nippon Steel has long worked to develop emissions reduction technologies for existing blast furnaces to ensure their continued operation.

Its approach to preserving business-as-usual involves injecting hydrogen as a reducing gas into conventional blast furnaces to partially replace coal-based reductants and thereby reduce CO₂ emissions. The technology forms the core of the company's COURSE50 and its next generation Super COURSE50.

COURSE50 is a technology development project that was undertaken from 2008 to 2022 with support from the Japanese government.⁹⁷ Using a 12 m³ test blast furnace built at the Kimitsu Area, the project tested the use of hydrogen-based by-product gases (coke oven gas) generated within the steelworks. COURSE50 targeted a total emissions reduction of 30%, combining more than a 10% reduction from hydrogen injection and around a 20% reduction through CCS.

The company has announced plans to begin a full-scale demonstration at the No.2 blast furnace at Kimitsu Area in FY2026, with the aim of implementing COURSE50 by 2030.⁹⁸

Super COURSE50 aims to achieve emissions reductions of more than 50% by injecting externally supplied hydrogen, while maintaining the thermal balance inside the blast furnace by heating the hydrogen. Testing began in May 2022, and in 2026 the company reported that it achieved a 44.5% reduction in CO₂ emissions from the test size blast furnace itself (1/400 the scale of a commercial unit [12 m³]).⁹⁹



Blast furnaces are generally considered to have an operating lifetime of around 17 years (typically 15–20 years).¹⁰⁰ Of the 9 blast furnaces without retirement announcements owned by Nippon Steel, five have already exceeded 20 years since their last relining.¹⁰¹ Notably, the Kimitsu Area, Nagoya Works, and Oita Area, where carbon capture and storage (CCS) is planned, each include blast furnaces that have surpassed the 20 year mark (CCS project locations are discussed in detail in [Issue 4.](#))

While the end of operating lifetime may not be the only consideration for retirement or relining, given the planned deployment of CCS, backed by significant subsidies at these sites, it appears that the company's intention is relining and continuing to operate blast furnaces.

97 Nippon Steel, *Breakthrough Technology Development to Decarbonize Steelmaking Processes*, Retrieved 1 May 2025.

98 Nippon Steel, *Nippon Steel's GX Initiatives*, p.14, 14 May 2026.

99 Nippon Steel, *Nippon Steel's GX Initiatives*, p.14, 14 May 2026.

100 Valentin Vogl, Olle Olsson, Björn Nykvist, Phasing out the blast furnace to meet global climate targets, *Joule*, 5, 10, (2021). <https://doi.org/10.1016/j.joule.2021.09.007>

101 Out of the ten blast furnaces operated by Nippon Steel, only one (BF No. 4 at Yawata) is scheduled for closure.

Blast Furnace Operating Lifetimes and Planned Carbon Capture Sites

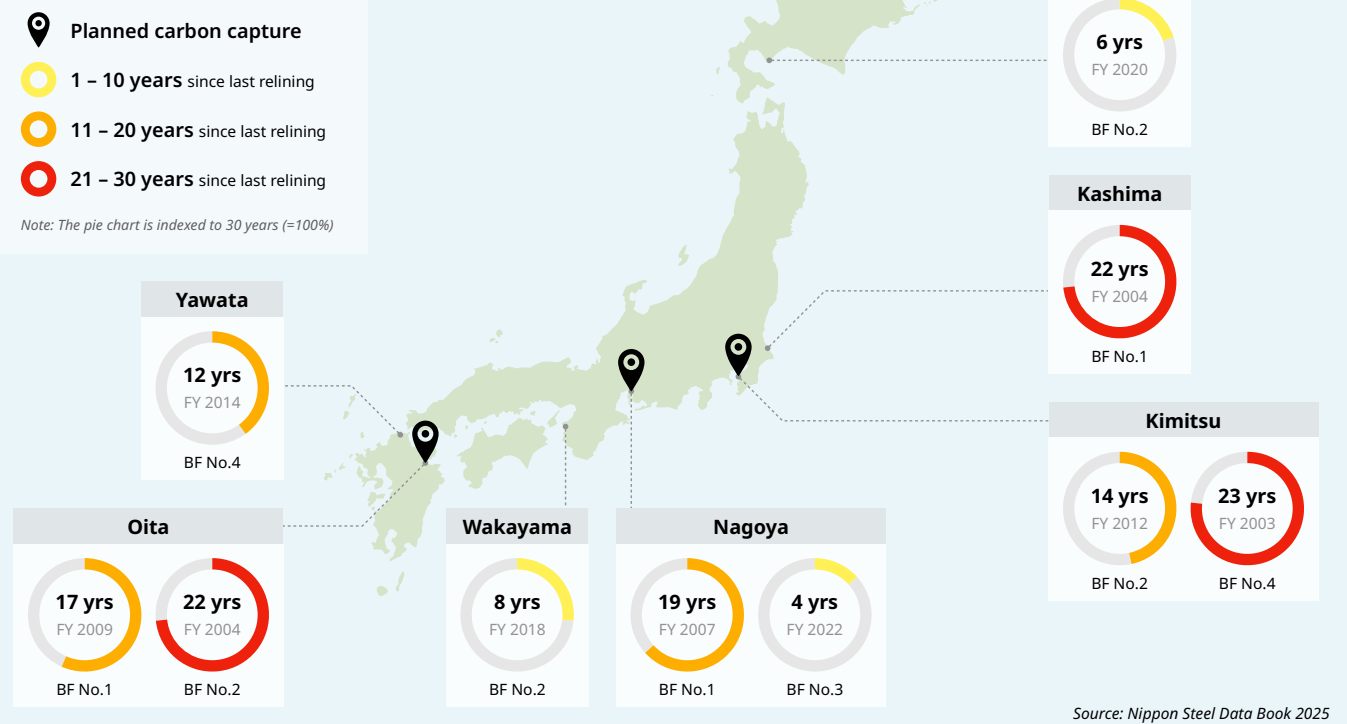


Figure 16: Blast furnace operating lifetimes and planned carbon capture sites

This technology is also suggested to be deployed in the company’s overseas operations in the future. For example, at the Annual General Meeting (AGM) in 2025, in response to a shareholder’s question regarding blast furnace relining at U. S. Steel, Nippon Steel stated that it would “deploy at U. S. Steel the technologies developed in Japan, which have already achieved around a 40% emissions reduction at Kimitsu.”¹⁰²

However, this technology faces key challenges in terms of both its timeline for deployment and its emissions reduction potential. Commercial deployment is not expected until around 2050, meaning it will not contribute to emissions reductions in the critical 2030 - 2040 period. In addition, while the company targets emissions reductions of over 50%, the remaining emissions are expected to be addressed primarily through CCS, with significant uncertainties, doubts, and impacts on communities and the environment.

The next section examines the status and limitations of CCS in greater detail.

Issue 4: “Breakthrough technologies” dependent on CCS

Nippon Steel has repeatedly emphasised the cost and technical challenges associated with fundamental shifts in ironmaking processes, such as the transition to H₂-DRI, while at the same time highlighting the importance of CCS as a means of continuing operation of existing blast furnaces, despite the technology’s own risks and high costs.

However, there are significant concerns as to whether CCS can deliver the scale of emissions reductions envisioned by Nippon Steel. In its Sixth Assessment Report (AR6), the IPCC recognised that CCS might be an option for decarbonisation in future, however it noted that the technology was not yet mature in the industrial and power sectors, and it currently “faces technological, economic, institutional, ecological, environmental and socio-cultural barriers”.¹⁰³ The current plans do not alleviate but only raise more concerns that the high reliance on CCS as a source of significant emissions reductions is a major risk to Nippon Steel’s climate strategy.

¹⁰² SteelWatch discussion with participants at Nippon Steel’s shareholder meeting.

¹⁰³ IPCC, *Carbon Dioxide Removal and Carbon Capture Utilisation and Storage in AR6 WGIII*, Retrieved 1 May 2026.

Uncertainty behind the promise

In 2024, the company participated in the “Advanced CCS Projects” led by the Japan Organization for Metals and Energy Security (JOGMEC), participating in three initiatives covering the Metropolitan Area, the Tohoku Region West Coast and Oceania. These projects aim to achieve annual CO₂ storage of 6 to 12 Mt by 2030, with final investment decisions (FIDs) expected during FY2026.¹⁰⁴

As these initiatives are being pursued as consortiums, Nippon Steel's involvement and role may seem limited to development of CO₂ capture technologies. However, Nippon Steel is the source of large proportions of emissions. The company's responsibility for these CCS projects must not be overlooked.

Table 3: Advanced CCS projects involving Nippon Steel

	Metropolitan Area CCS	Oceania CCS	Tohoku Region West Coast CCS
Emission source	<ul style="list-style-type: none"> Nippon Steel Kimitsu Area multiple other industries 	<ul style="list-style-type: none"> Nippon Steel Nagoya Works multiple other industries 	<ul style="list-style-type: none"> Nippon Steel Oita Area multiple other industries
Storage area	offshore Chiba (Pacific side)	Oceania	offshore Tohoku
Storage volume	approx. 1.4 Mtpa	approx. 2 Mtpa	approx. 1.5-1.9 Mtpa
Main Company	<ul style="list-style-type: none"> INPEX Nippon Steel Kanto Natural Gas Development 	<ul style="list-style-type: none"> Mitsubishi Corporation Nippon Steel Mitsubishi Chemical Mitsubishi Clean Energy ExxonMobil Asia Pacific 	<ul style="list-style-type: none"> ITOCHU Nippon Steel Taiheiyo Cement Mitsubishi Heavy Industries INPEX ITOCHU Oil Exploration

The application of CCS on blast furnaces raises a number of significant concerns.

First, there are significant uncertainties regarding capture rates and technological feasibility. Integrated steelworks contain multiple CO₂ emissions sources with varying concentration levels, making it highly uncertain whether large-scale CO₂ capture is possible in practice. While Nippon Steel is conducting research and development on low-concentration CO₂ capture technologies under the NEDO Green Innovation Fund, the technology has not yet reached the pilot stage.¹⁰⁵

Second, CCS does not address continued reliance on coal-based production. While CCS may reduce a portion of direct emissions, it does not mitigate upstream emissions such as methane from coal mining, nor does it significantly reduce harmful air pollutants including SO_x and NO_x. As a result, many of the environmental and health impacts associated with coal-based production would remain.

Third, there are concerns regarding economic viability. One study¹⁰⁶ suggests that, in Japan, BF-BOF with CCS¹⁰⁷ and H₂-DRI-EAF are expected to be at broadly similar cost levels in 2030. While the use of DRI offers a pathway away from coal dependence, the blast furnace route would remain fundamentally reliant on coal even with CCS applied. In addition, with emerging green markets in Europe, customers show no interest in paying a premium for coal-based steel, regardless of CO₂ capture rates.¹⁰⁸ Therefore, blast furnace production using CCS risks failing to gain support from either green markets or conventional markets.

¹⁰⁴ JOGMEC, *Advanced Efforts for Commercialization of CCS*, 24 July 2024.

¹⁰⁵ NEDO Green Innovation Fund, *Development of a low-concentration CO₂ separation system using an innovative absorbent*, November 2025.

¹⁰⁶ BloombergNEF, *Decarbonization of Japan's Steel Industry: Economics and Path Forward*, 3 December 2025.

¹⁰⁷ This analysis assumes a 90% CO₂ capture rate for CCS. If the capture rate falls below this level, costs could increase further.

¹⁰⁸ The EU LESS steel labeling system shows BF-BOF CCUS will likely achieve only Label D (at best Label C).

Finally, challenges also remain regarding CO₂ transport and storage. Nippon Steel's CCS strategy includes projects involving cross-border transport and offshore storage that remain commercially unproven and largely untested at scale. While substantial technological innovation in transport and storage infrastructure would be required, even if successfully implemented, CO₂ transport and storage themselves would still involve high costs and a cost disadvantage compared to other emissions reduction pathways.¹⁰⁹ This raises further questions regarding the long-term feasibility, scalability and economic viability.

Relying heavily on CCS despite its uncertainties, while continuing coal use, is not consistent with the vision of a net-zero society¹¹⁰. A closer look at individual CCS projects reveals further challenges. The following sections examine these issues through the examples of the Metropolitan and Oceania projects involving Nippon Steel.

Metropolitan Area CCS Project

The Metropolitan Area CCS project plans to capture CO₂ emissions from the Keiyo industrial zone along Tokyo Bay in Chiba Prefecture, including Nippon Steel's Kimitsu Area. The captured CO₂ would be transported via an 80 km pipeline across the Boso Peninsula and stored in deep saline aquifers under the Pacific Ocean just offshore of the scenic Kujukuri coastline.

A key concern is that the project is being advanced rapidly, with exploratory drilling at storage sites scheduled in July 2026,¹¹¹ despite the lack of a sufficient environmental assessment and adequate engagement with local residents. While public briefings were announced through local notices, the information outreach has been reported to be limited, leaving many residents unaware and unable to participate in consultation. Residents living near the steelworks who were able to participate in these briefings expressed concerns, noting that "continuing coal-based operations while simply transporting CO₂ through pipelines for storage is misguided." In addition, residents in the offshore storage area have raised concerns about the siting of infrastructure in coastal zones popular for surfing.¹¹²

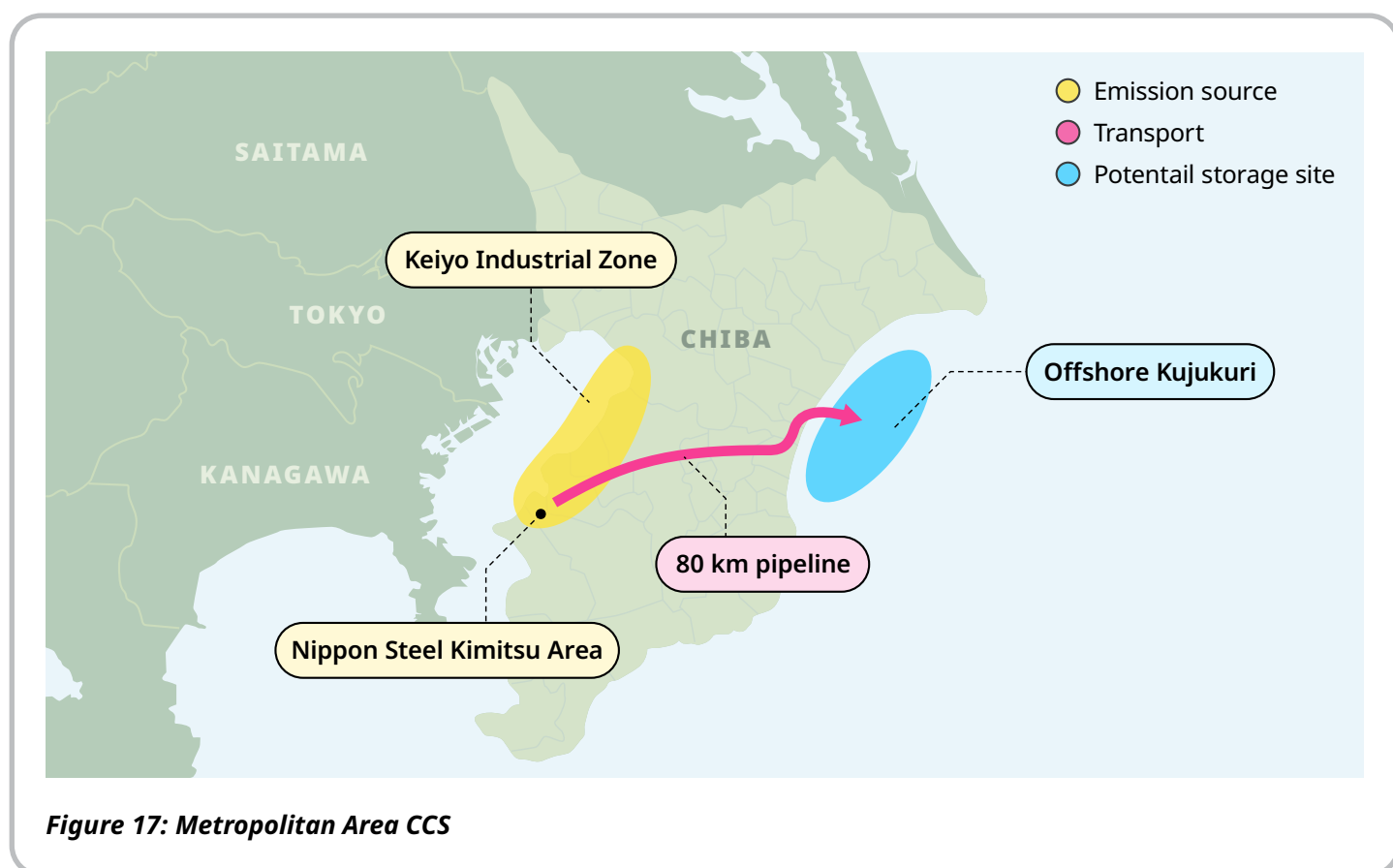


Figure 17: Metropolitan Area CCS

¹⁰⁹ BloombergNEF estimates that CCS shipping and storage costs alone could range from JPY 31,800 - 35,000 (USD \$200 - 220) per tonne of CO₂ equivalent by 2030, and remain above JPY 23,500 (USD \$150) by 2050.

¹¹⁰ A state in which greenhouse gas emissions are reduced as far as possible and any remaining emissions are balanced by removals.

¹¹¹ Nikkei, *Underground CO₂ Storage off Chiba and Kujukuri Coasts: Test Drilling Survey to Begin as Early as July*, 22 April 2026.

¹¹² Interviews with local residents conducted by SteelWatch.

Oceania CCS Project

In parallel, the Oceania CCS initiative envisages the storage of CO₂ outside Japan.

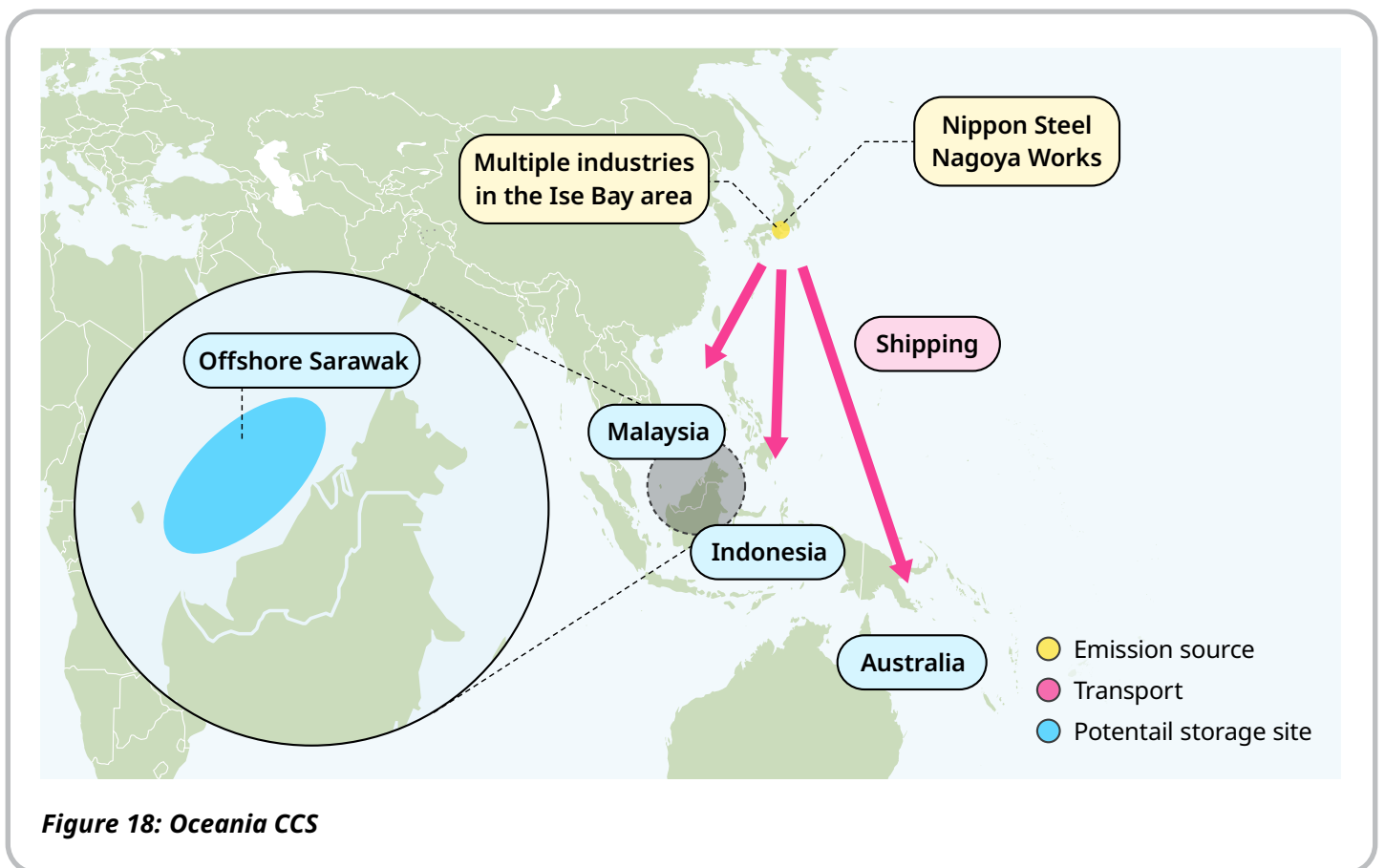
Research and development on CO₂ capture, liquefaction, shipping, and utilisation is advancing across multiple initiatives. For now, these efforts remain largely in the pre-investment and design validation stage, with no large-scale, fully operational cross-border CCS chain yet in place.

In this context, the JOGMEC's Oceania CCS Project, in which Nippon Steel is participating, considers countries with potential storage sites such as Malaysia, Australia, and Indonesia as candidate storage destinations. ExxonMobil, which is participating in the CCS project, is advancing the development of storage sites across multiple countries in the Oceania region, and it has been suggested that, depending on the progress of bilateral agreements, CO₂ transport and storage involving multiple countries could become possible in the future.¹¹³

For example, in November 2025, JOGMEC signed a strategic energy agreement with PETROS (Petroleum Sarawak Berhad), an oil company owned by the government of Sarawak State in Malaysia, indicating Sarawak as one potential storage location. The area is estimated to have over 1 billion tonnes of CO₂ storage capacity across offshore depleted oil fields. Among the nine Advanced CCS projects, some projects are already proceeding with agreements with PETROS that envision the region as a CO₂ storage hub.¹¹⁴



Kujukuri beach, Chiba. SteelWach, February 2026.



¹¹³ [Mitsubishi Corporation](#), *Introduction to Initiatives on Overseas CCS Value Chains: The Oceania CCS Project and the Northern Offshore Malay Peninsula CCS Project*, 8 November 2024.

¹¹⁴ [PETROS](#), *PETROS Signs Three Strategic Energy Agreements with International Industry Players*, 11 November 2025.

These developments indicate that the project strategy is being shaped on the assumption of cross-border CO2 transport and long-term storage capacity that has not yet been fully demonstrated.

As the window for relining blast furnaces in Japan approaches, the question arises: why continue investing in blast furnaces when they require reliance on uncertain, unproven CCS projects? While many researchers are expending significant efforts developing technology to reduce, capture and store blast furnace emissions, we must recognise that these are extraordinary, complicated and highly imperfect ways of delaying necessary and inevitable blast furnace retirements.

Gambling on CCS means CO2 emissions from blast furnaces continue for the foreseeable future, when there are far better technology pathways to truly near-zero-emissions production Nippon Steel can start today.

Box 4: SteelWatch Corporate Scorecard

In the SteelWatch Corporate Scorecard published in March 2026,¹¹⁵ Nippon Steel ranks 17th out of 18 steelmakers assessed, scoring 16.8 out of 100 points. While no company scored above 50, highlighting sector wide shortcomings in climate action, Nippon Steel remains substantially behind.

The low score is primarily driven by the company's high GHG emissions intensity, increasing trends in coal consumption and the lack of a credible plan to phase out coal-based blast furnaces. The Scorecard notes that "without urgent action to phase out coal, Nippon Steel is at risk of locking itself out of the opportunity to scale its transformation in time." While the company continues to maintain substantial blast furnace capacity, the more fundamental concern lies in its continued reliance on a strategy based on the ongoing use of existing blast furnaces.

SteelWatch Corporate Scorecard 2026

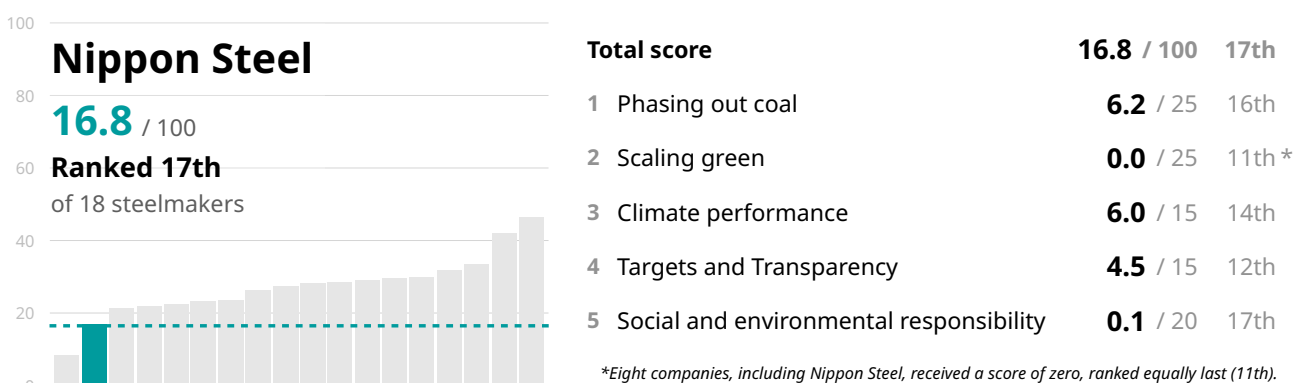


Figure 19: Nippon Steel score in SteelWatch Scorecard 2026

115 SteelWatch, SteelWatch Corporate Scorecard, 31 March 2026.

Conclusion

Nippon Steel is a substantially different company than it was last year. The U. S. Steel acquisition and subsequent expansions of its operational scale and influence in the industry mean Nippon Steel's responsibility for global climate has fundamentally changed. The company's decisions on decarbonisation pathways now directly shape global emissions trajectories.

The company's future outlook of its fleet still relies heavily on continuing coal-based steelmaking. Rapid and large-scale emissions reductions required in the 2030s are largely delayed, while it prioritises investment in technology to prolong life of blast furnaces, such as CCS and hydrogen injection. Furthermore, its strong emphasis on promoting GX Steel also risks delaying structural transformation by subsidising and preferencing steel made without investments in deep decarbonisation.

To be the best steelmaker, Nippon Steel must not just make quality steel, but take its growing global climate responsibilities seriously. Investment decisions to increase EAF capacity in Japan and new DRI construction in the US are steps in the right direction. Now, the company faces a critical test of whether these projects remain isolated efforts or embrace them as pivots towards a structural transformation.

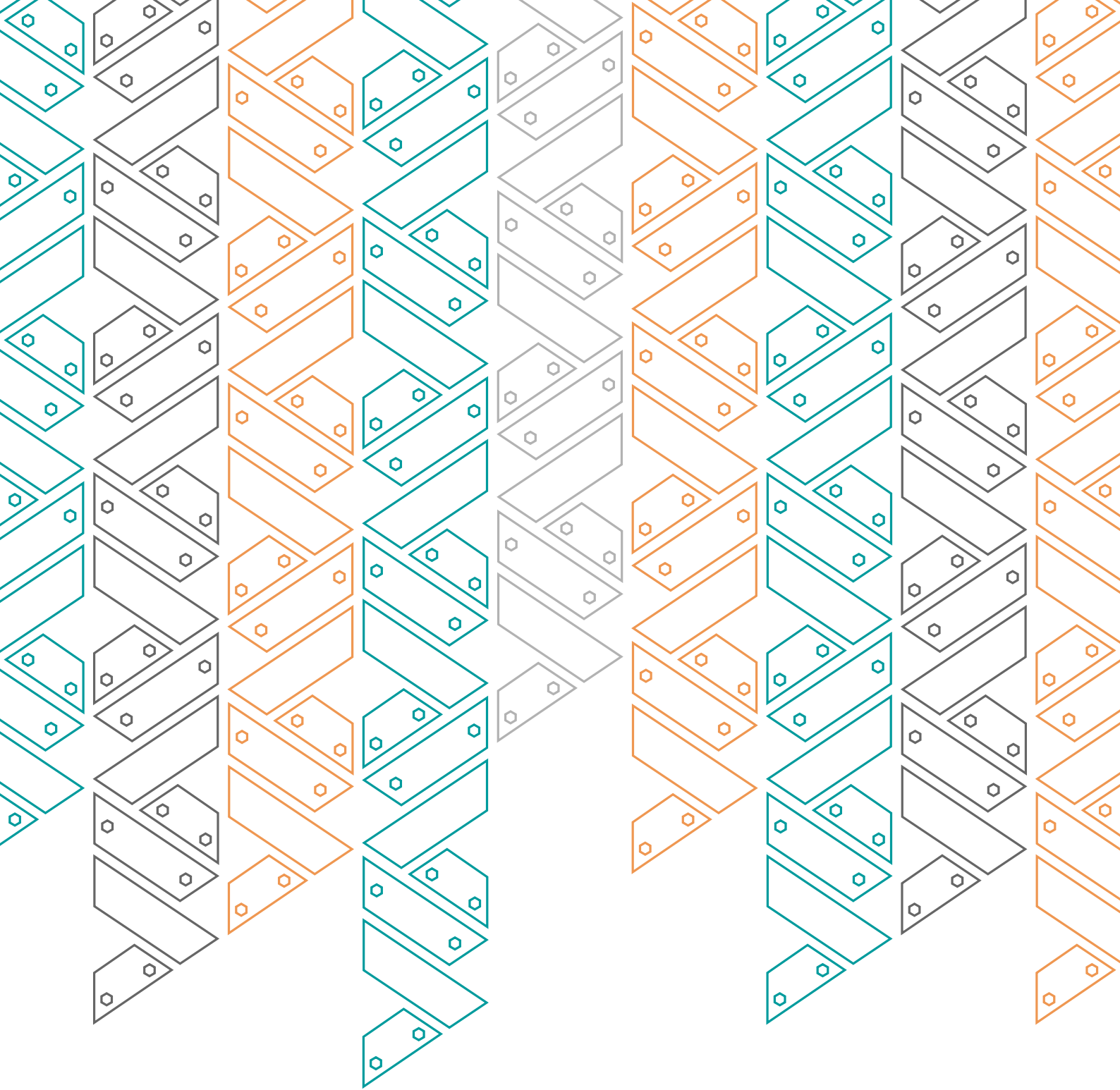
Without a fundamental shift, Nippon Steel risks becoming a company that continues to expand while falling behind in the transition.

In light of these challenges, this report calls for the following actions:

- **Halt blast furnace relining and investments to prolong and expand coal use.**
Plans to reline and extend life of blast furnaces at the U. S. Steel's Gary Works must be halted immediately. A comprehensive transition plan from coal-based steelmaking to low-emissions technology, developed with meaningful consultation with workers and impacted communities, should guide further investment decisions in U. S. Steel.
- **Set clear retirement dates for all blast furnaces, both in Japan and overseas.**
At present, retirement plans remain unclear for most blast furnaces, leaving no credible transition pathway. A consistent phase out plan is essential across both domestic operations and overseas assets, including joint ventures and U. S. Steel.
- **Make concrete investments in securing low-emissions iron.**
The emissions reduction potential of EAFs depends on both electricity and iron inputs. Given constraints in scrap availability, the company must clarify its strategy for procuring and investing in low-emissions iron sources, such as direct reduced iron, in the short and medium term.
- **Align R&D and investments with near-zero emissions compatible technology.**
CCS on coal-based blast furnaces is fundamentally incompatible with carbon neutrality. High reliance on CCS as an emissions reduction strategy undermines climate risks of continued reliance on coal, while deviating capital from investing in more effective and proven alternative solutions.
- **Ensure alignment of emissions reduction efforts across both domestic and international operations**
Currently, inconsistencies exist between Japan-based operations, overseas assets, and joint ventures. As a global company, Nippon Steel must clearly articulate how different transition pathways towards decarbonisation across its business units fit within a coherent, group-wide decarbonisation strategy.

To become a true global leader in climate action, it is essential to go beyond the extension of its current strategy and step into structural transformation.

SteelWatch urges Nippon Steel to look at its ambition to become the "world's best steelmaker" as being the one that makes the best quality, the most sustainable, and the most socially responsible steel in the world.



SteelWatch is a civil society organisation with a vision for a steel industry that underpins a thriving zero-emissions economy. Our mission is to turbo-charge the transformation to a decarbonised steel sector that enables the environment, communities and workers to thrive. We challenge the prevailing complacency, support civil society impact, and campaign for greater ambition and speedier climate action by steel companies internationally.

Any inquiries can be directed to info@steelwatch.org