MAY
2025

No Time For Caution

Nippon Steel Corporate Climate Assessment 2025 Update

STEELWATCH

Bringing climate urgency to steel

Acknowledgements

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This report is also available in Japanese on our website.

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Nippon Steel's East Japan Works, Kashima steelworks. SteelWatch / FINE Co.,Ltd.

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List of acronyms

AM/NS India	ArcelorMittal/Nippon Steel India	H2-DRI	hydrogen-based direct reduced iron
BF-BOF	blast furnace-basic oxygen furnace	H2	hydrogen
CCUS	carbon capture, utilisation and storage	Met coal	metallurgical coal
CO2	carbon dioxide	Mt	million tonnes
CO2e	carbon dioxide equivalent	Mtpa	million tonnes per annum
DRI	direct reduced iron	SBTi	Science-Based Targets initiative
EAF	electric arc furnace	tCO2	tonnes of carbon dioxide
GHG	greenhouse gas	t	tonne

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Executive Summary

Nippon Steel is in uncharted waters. It rose to become the world's fourth largest steel producer in spite of the resource limitations of its home market of Japan, and its ambition for growth has led to plans to expand its holdings from North America, to India, to Europe, and to Australia. However, it has yet to transition its corporate mindset to reflect that it is no longer just a blast furnace steelmaker, or even just a Japanese steelmaker.

As a global steelmaker, Nippon Steel has a responsibility to ensure its ambition for growth is in line with global efforts to tackle the climate crisis, and that its efforts hasten, not hamper, the decarbonisation of the steel industry. Nippon Steel must be future-fit for the inevitable zero emission economy.

The coming decade is the critical time to future-proof the company, and that requires new thinking for Nippon Steel. In an era of climate crisis, accelerating transition and fierce competition, the company is under increasing pressure to use its global reach to realign supply chains and establish new business models, but it has yet to seriously question its outdated model of importing coal and iron ore to do iron and steelmaking in Japan.

The reality of steelmaking in a carbon constrained world is that coal is a dead-end. Steelmakers cannot sufficiently decarbonise in a timely manner if coal remains their focus. Attempting to bring incremental 'improvements' to this current model is slowing down and limiting the level of business transformation Nippon Steel needs for it to become a globally performing steelmaker.

Nippon Steel's Japanese and Korean counterparts are increasingly making bold investments in low-emissions green iron production in favourable geographies from the Middle East to Australia. Nippon Steel's viability as a steelmaker depends upon its ability to be flexible and reposition for this new era. This report is intended to contribute to a dialogue about what is possible as well as the risks of delayed decarbonisation.

Nippon Steel's current climate strategy requires urgent action on four fronts:

1. **Accelerating decarbonisation before 2040:** The current decarbonisation roadmap delays substantial emissions reductions until after 2040, creating critical "*empty decades*" that leave the company delivering too little on climate too late. Investment in green iron (H2-DRI) production and supply chains in favorable geographies is one critical interim measure to reduce emissions using available technologies, but the company has no clear strategic plan on this yet.

2. **Establishing a clear phase-out from coal:** During these "empty decades", the company will deeply entrench coal into its business. It already plans to operate coal-based blast furnaces into the 2050s, making its long-term decarbonisation task harder.

3. **Expanding emissions accountability to include its overseas operations:** Nippon Steel is expanding coal-based production in India and has pledged additional investment in blast furnaces as part of its proposed acquisition of U.S. Steel. These developments raise questions about the credibility of the company's carbon neutrality commitments, especially as it plans to further expand operations overseas.

4. **Aligning medium-term targets with a 1.5C trajectory:** At the last annual general assembly in June 2024, Nippon Steel faced its first-ever climate-related shareholder resolutions, which received substantial support (up to 28%), highlighting investor demands for improvements in lobbying transparency, emissions reduction strategies, and climate disclosures. While the company has since improved on disclosure and active engagement both with investors and civil society, it has yet to shift its course and undertake a fundamental revision of its climate strategy adding new and deeper interim reduction targets.

Nippon Steel has a lot to do on its climate commitments, and little time to do it. To protect its reputation as an industry-leading steelmaker and build the global business it is aspiring to, it needs to take urgent steps to transform its mindset and production process beyond coal.

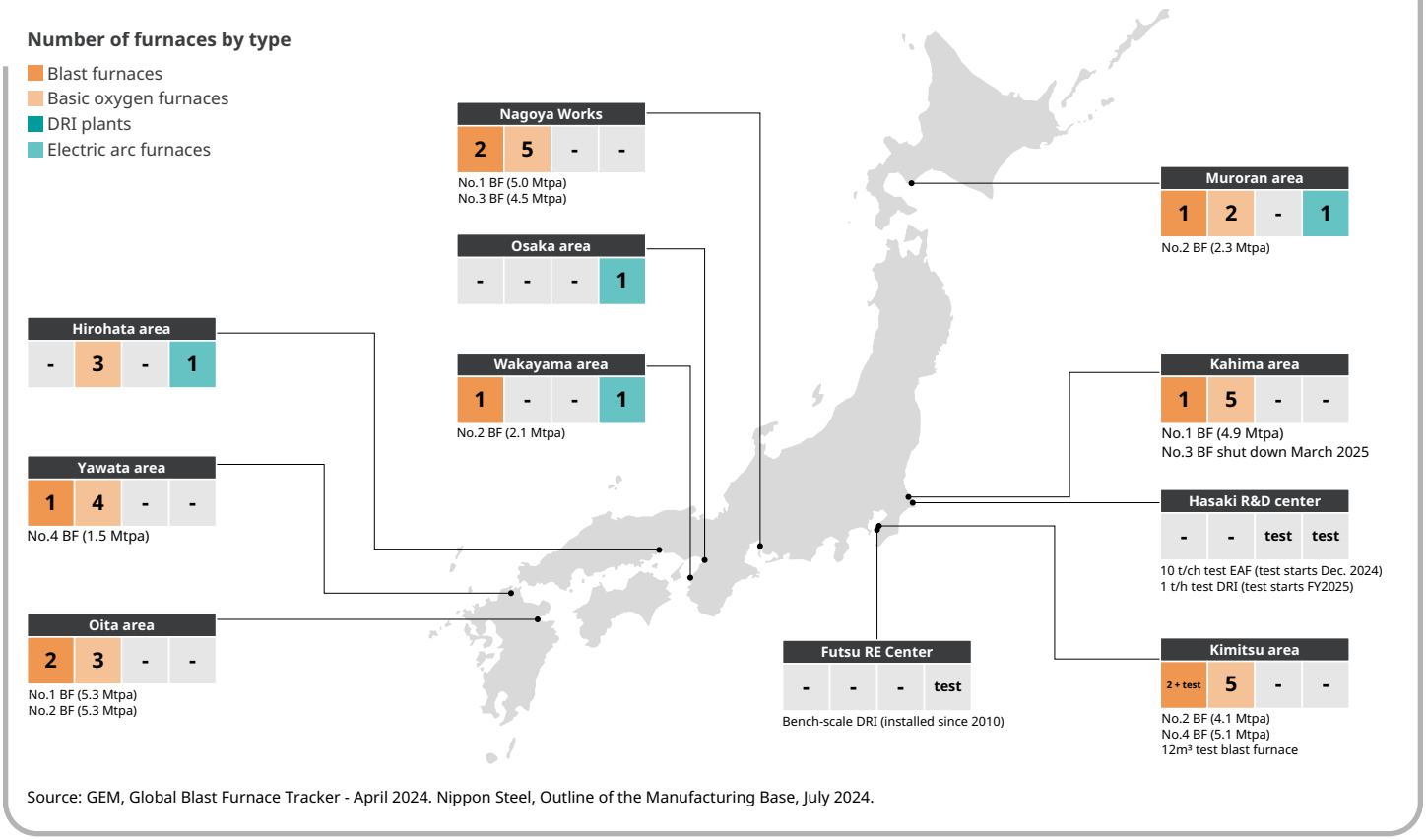
1. What's new with Nippon Steel in 2024-25

Overview of Nippon Steel Corporation

In 2023, Nippon Steel was the fourth-largest steelmaker in the world,[1] with its annual crude steel production exceeding 43 million tonnes.[2] For the fiscal year ending in March 2024 (FY2023),[3] the company reported consolidated revenue of approximately 65 billion USD.

In its home market of Japan, the company primarily relies on coal-based blast furnace steelmaking, and it owns 10 of the 19 blast furnaces[4] currently operating in the country (down from 11, following the closure of the No. 3 blast furnace at the Kashima Works in March 2025).[5][6] This is also down from the 16 blast furnaces (59.7 Mtpa) that Nippon Steel operated in 2013.[7,8]

Figure 1: Map of Nippon Steel's fleet in Japan



Source: GEM, Global Blast Furnace Tracker - April 2024. Nippon Steel, Outline of the Manufacturing Base, July 2024.

While the number of its facilities is decreasing, the company is increasing its vertical integration across its supply chain — from raw material procurement to steel production and distribution — by increasing self-sufficiency in key inputs such as iron ore and coal.[9] The company supplies a diverse range of steel products to a wide array of sectors, including the automotive and construction industries, and is focused on shifting from commodity-grade exports with low profit margins to high-value-added products.[10]

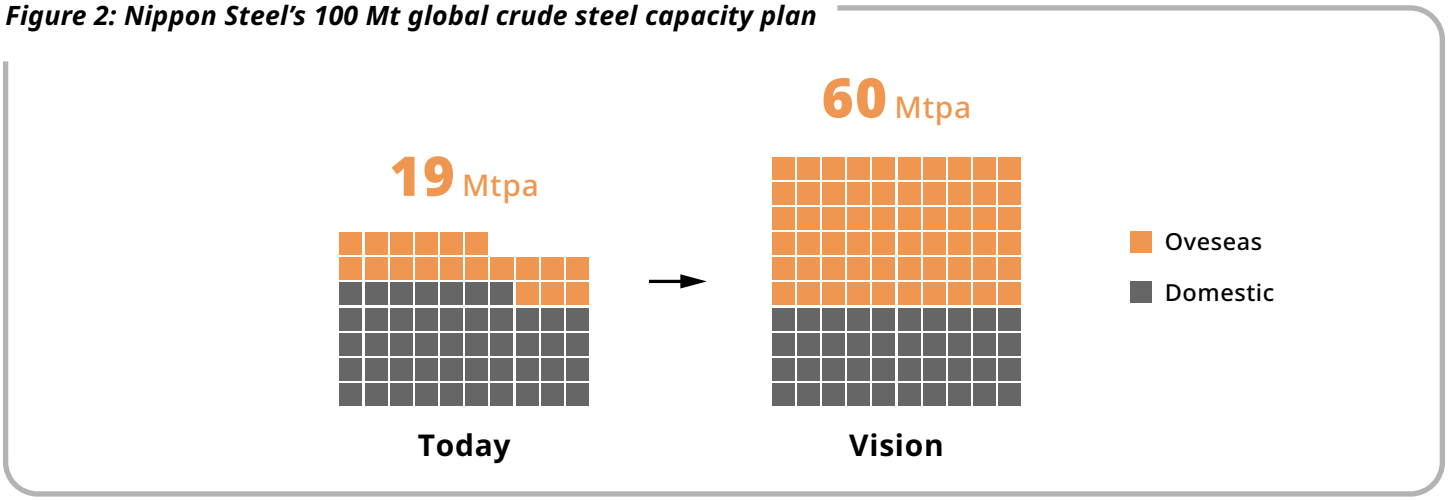
Anticipating a long-term decline in domestic demand, the company has set a target to achieve "100 million

[1] **World Steel Association**, *Top steel-producing companies 2023/2022*. Retrieved on 2 May 2025.
[2] Ibid.
[3] **Nippon Steel**, *Flash Report Consolidated Basis Results for Fiscal 2023,* 9 May 2024.
[4] **JFE Steel** announced that it will temporarily shut down one of its blast furnaces at the Kurashiki area of its West Japan Works in mid-May 2025. Following this shutdown, the number of operating blast furnaces in Japan will be reduced to 18.
[5] At the end of fiscal year 2023, Nippon Steel had 11 blast furnaces online (total of 48 Mtpa of ironmaking capacity), and one (Kashima #3 - 4.9 Mtpa) was permanently shut down in spring 2025. According to Nippon Steel's plans, one more is to be shut down by 2030, meaning that the company would then have 9 operating blast furnaces (the company has not yet announced which blast furnace it would close down).
[6] **SteelWatch**, Nippon Steel's latest coal-based blast furnace closure highlights its lack of tangible green transformation plans, 31 March 2025.
[7] **Nippon Steel**, *Nippon Steel's Green Transformation (GX) Initiatives,* p.13, 13 March 2025.
[8] Blast furnace capacity is sourced from the **Global Energy Monitor Global Iron and Steel Tracker**, For the No. 3 blast furnace at Kimitsu Steel Works, shut down in 2016, see the following sources. **ISIJ International**, *Production and Technology of Iron and Steel in Japan during 2016*, 2017.
[9] **Nippon Steel**, *Nippon Steel Integrated Report 2024,* p.33,34, September 2024.
[10] **Nippon Steel**, *Nippon Steel Integrated Report 2024,* p.26, September 2024.

tonnes of global crude steel capacity", with 60 million of this located outside Japan.[11] It is actively seeking growth opportunities overseas, citing India and ASEAN countries as markets with steadily increasing steel demand, and the United States as the country with the largest demand for high-grade steel.

Nippon Steel states that its core strategy is to acquire integrated steel mills through acquisitions and investment, and to establish and expand local production bases with regional partners. It currently has bases in India, ASEAN, China, North and Central America, South America, Europe and the Middle East with the company's most recent steel production investments in India, Thailand and the United States.[12] As of March 31, 2024, Nippon Steel's global steelmaking operations employ approximately 110,000 people.[13]

Figure 2: Nippon Steel's 100 Mt global crude steel capacity plan



In March 2021, Nippon Steel announced, for the first time, its "*Carbon Neutral Vision 2050*",[14] which has since become the core of its climate change strategy. In FY2023, Nippon Steel's CO2 emissions (Scope 1 and 2) totaled approximately 76.5 million tonnes[15] — just 4.1 million tonnes above its 2030 target of 72.4 million tonnes. Given the ongoing downsizing of domestic production facilities, achieving the target ahead of schedule is now within reach.

However, it is critical to note that the group-wide carbon neutral target for 2050 does not include the company's high-emission- intensity overseas equity-method affiliates, such as ArcelorMittal/Nippon Steel India (AM/NS). This exclusion makes the target appear more easily achievable than it would be under a more comprehensive boundary, and this should be taken into careful consideration (see Annex Table A1).

First-ever climate shareholder resolutions

At Nippon Steel's 100th annual general meeting in June 2024, its shareholders voted for the first time on not one but three resolutions demanding a strengthening of the company's climate strategy and policies.[16] Proposals 1 and 2 were co-filed by the Australasian Centre for Corporate Responsibility (ACCR) and Corporate Action Japan (CAJ), while Proposal 3 was co-filed by one of Europe's largest asset managers, Legal & General Investment Management (LGIM) and ACCR.

The three proposals achieved the following results:

> **Proposal 1: More ambitious emissions reduction targets – *21.48%* support**
> Nippon Steel to set and disclose short and medium-term greenhouse gas (GHG) emissions reduction targets aligned to the goals of the Paris Agreement for scope 1, 2, and 3 emissions; along with disclosure of planned capex for decarbonisation investments.

[11] **Nippon Steel**, *Toward 100 million ton global crude steel capacity*, March 2021.
[12] **Nippon Steel**, *Nippon Steel Integrated Report 2024,* p.3, 27, 105, September 2024.
[13] **Nippon Steel**, *Nippon Steel Integrated Report 2024,* p.10, September 2024.
[14] **Nippon Steel**, *Nippon Steel Sustainability Report 2021*, p.12, March 2021.
[15] Boundary of data collection is Nippon steel and associated EAF mills (Osaka Steel, Sanyo Special Steel, Nippon Steel Stainless Steel, Oji Steel, Tokai Special Steel, Tokyo Kohtetsu, Nippon Steel Structural Shapes Corporation, Ovako, Sanyo Special Steel Manufacturing India, and Standard Steel).
[16] **ACCR**, *Shareholder proposals to Nippon Steel Corporation on climate targets, executive compensation and climate lobbying*, 21 May 2024. Retrieved on 2 May 2025.

Proposal 2: Executive remuneration linked to emissions reductions – *23.01%* support
Link executive compensation to the achievement of the company's GHG emissions reduction targets.

Proposal 3: Improve climate-related lobbying disclosure – *27.98%* support
Disclose climate-related policy positions and lobbying activities, including direct lobbying and industry association memberships, and review of these for alignment with the Company's goal of carbon neutrality by 2050.

In particular, the proposal for increased climate-related lobbying disclosure earned 28% support, which is an exceptionally high level for a climate resolution at a Japanese company,[17] and demonstrates strong concerns among investors about the company's current lobbying practices. Major European investors including Amundi, Nordea Asset Management and Storebrand Asset, expressed their support for the proposal ahead of the AGM, which highlights the breadth of shareholder concern about Nippon Steel management's inadequate efforts to address climate risks.

Nippon Steel's Board of Directors expressed opposition to the shareholder proposals, maintaining the stance that the company's current efforts are adequate.[18] In the Integrated Report 2024,[19] released a few months later, there was still no direct reference to the proposals or any indication of planned revisions regarding the key issue of emissions targets and decarbonisation investments. This response has continued to raise concerns among observers that the company is still failing to adequately address shareholder concerns over how it addresses the climate crisis.[20]

In the months since, the company has partially addressed two concerns raised by the resolutions. The first was to expand emissions disclosure for its subsidiaries and joint ventures, which we discuss in Section Two. The second was to improve disclosure of its lobbying activities.

From steelmaker to coal miner?

Of major concern, raised by the investors through the example of the shareholder resolution in 2024, are the company's repeated business decisions that deepen its reliance on coal. A clear example of this is the company's increased direct investment in coal mining.

At the end of 2023, it indirectly acquired a 20% interest in the coal business of Teck Resources Limited in Canada,[21] followed by an investment in August 2024 in Whitehaven Coal's Blackwater coal mine in Australia.[22] Here, Nippon Steel co-acquired a 20% interest in the mine (together with JFE Steel, which took 10%) for 720 million USD. The Blackwater project involves a combined investment of approximately 1.1 billion USD (around 160 billion JPY) by the two Japanese steelmakers, effectively supporting the extension and expansion of an existing coal mine.

Nippon Steel had stated it "*would like to raise the self-sufficiency ratio to around 40% in order to neutralise the impact of raw material prices on market products*", referring to both coal and iron ore.[23] As of FY 2022, the company sourced about 20% of its coal from mines in which it holds equity stakes, so this goal effectively signals an intention to double that ratio.[24]

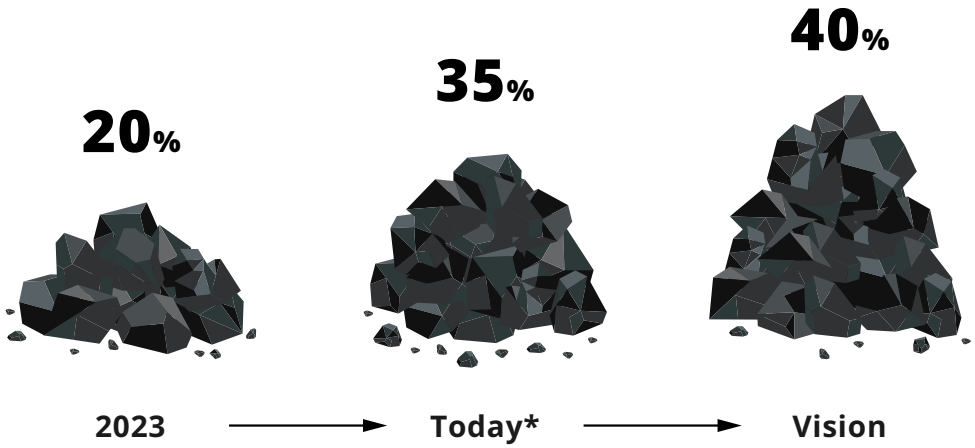
Nippon Steel explains that the purpose of the investment is "to secure a stable supply of high-quality steelmaking coal" and to secure future earnings.[25] However, as the world accelerates its decarbonisation efforts, making coal-based business expansion a core part of its strategy could pose significant long-term business risks.

According to Nippon Steel's 2024 Integrated Report, the company consumes approximately 25 million tonnes of coal annually (not including minority interests).[26] It has investments in several coal mines with a total annual

[17] **ACCR**, *Nippon Steel: shareholders deliver Japan's largest ever vote in support of climate lobbying resolution*, 25 June 2024. Retrieved on 2 May 2025.
[18] **Nippon Steel**, *Notice Concerning the Opinion of the Company's Board of Directors on Shareholder Proposals,* 16 May 2024.
[19] **Nippon Steel**, *Nippon Steel Integrated Report 2024,* September 2024.
[20] **Transition Asia**, *2024 INTEGRATED REPORT UPDATES: NIPPON STEEL*, September 2024.
[21] **Nippon Steel**, *News Release, Nippon Steel to indirectly acquire a 20% interest in the steelmaking coal business of Teck Resources Limited*,14 November 2023. Retrieved on 2 May 2025.
[22] **Nippon Steel**, *Nippon Steel acquires equity interests in Blackwater Coal Mine in Australia*, 22 August 2024.
[23] **Reuters**, *Nippon Steel to hunt for more coking coal, iron ore assets-executive*, 30 November 2023. Retrieved on 2 May 2025.
[24] **Nippon Steel**, *Integrated Report 2024*, p.135, September 2024.
[25] **Nippon Steel**, *Acquisition of interest in the steelmaking coal business in Canada,* p.5,10, 14 November 2023.
[26] **Nippon Steel**, *Integrated Report 2024*, p.10, September 2024.

production capacity of 69 million tonnes, and its recent acquisition of a 20% interest in the Blackwater coal mine adds an additional 10 million tonnes of annual supply capacity.[27]

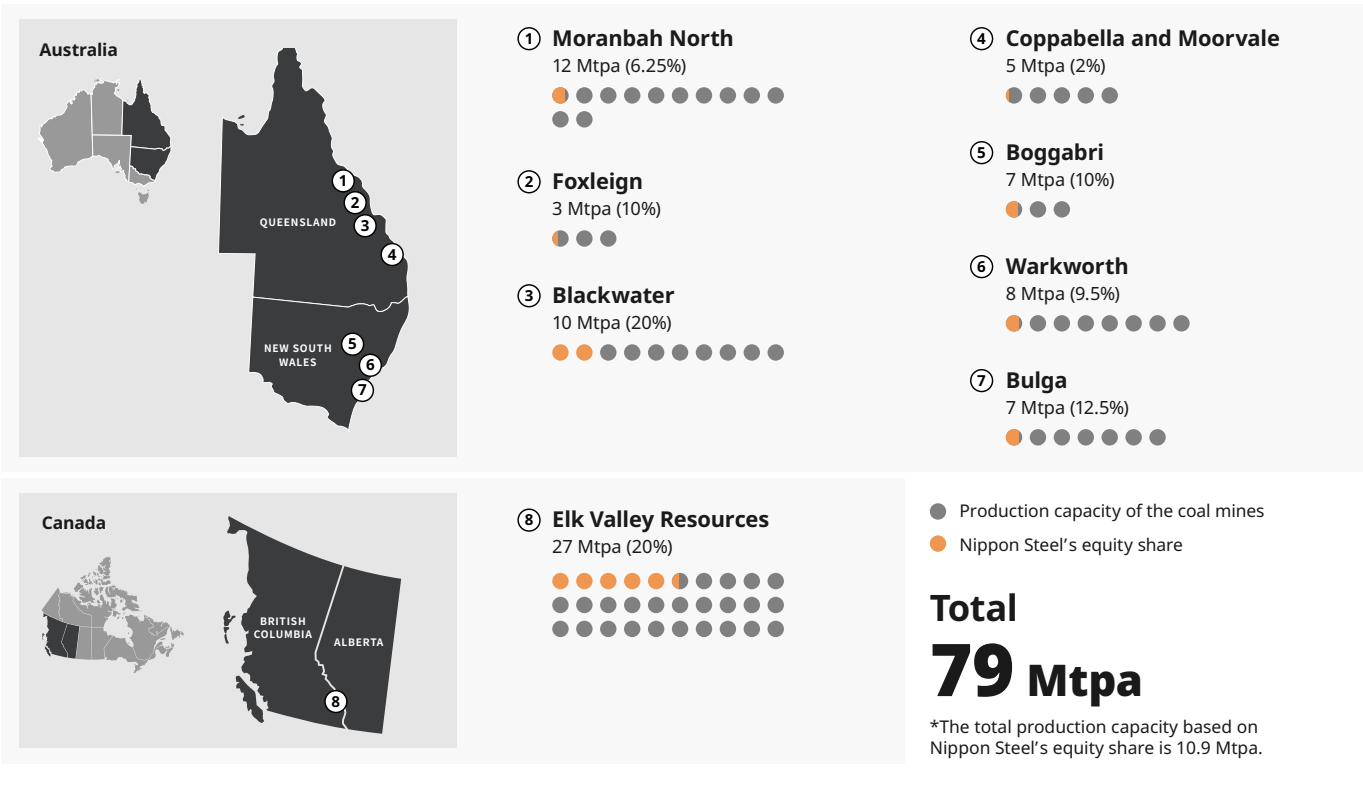
Figure 3: Proportion of coking coal procured in-house



*Completion of some of the most recent acquisition announcements remains subject to approvals by the relevant authorities.

With this, it has an ownership share in mines that have a total annual production capacity of 79 million tonnes. For comparison, a company specialising in metallurgical coal, BHP Mitsubishi Alliance, has a production capacity of approximately 60 million tonnes per year.[28]

Figure 4: Nippon Steel ownership stake in coal mines



This illustrates that Nippon Steel is not only Japan's largest coal-based steelmaker, but it is also becoming a coal company, is also becoming a coal company, and its investments encourage the expansion of overseas coal mines and related businesses.[29] This direction runs counter to its stated carbon neutral vision, with no end in sight to increased coal usage and further climate harm.

[27] **Nippon Steel**, News Release, *Completion of acquisition of 20% interest in Blackwater Coal Mine in Australia*, 31 March, 2025. Retrieved on 2 May 2025.
[28] Note that production capacity figures are for total mine production capacity and not apportioned based on Nippon Steel's ownership share.
[29] **SteelWatch**, *SteelWatch Explainer: Met coal: what it is and why it is a climate risk*, 23 April 2025.

Strategy to expand overseas assets - ongoing U. S. Steel acquisition

Against the backdrop of shrinking domestic demand, Nippon Steel is accelerating its overseas expansion with the goal of increasing its global crude steel production capacity to 100 million tonnes. However, its recent expansion efforts have focused heavily on blast furnace-based production. With its planned acquisition of U. S. Steel in particular bringing global attention to Nippon Steel and its coal-first mindset.

In December 2023, Nippon Steel proposed a buyout agreement for approximately 14.9 billion USD,[30] covering U. S. Steel's fleet of facilities, including eight aging blast furnaces, one recently built state-of-the art electric arc furnace, two iron ore mines, and more.[31] If the deal is realised, Nippon Steel would become the world's third largest steelmaker, significantly increasing its overseas production ratio and marking a turning point for the company.

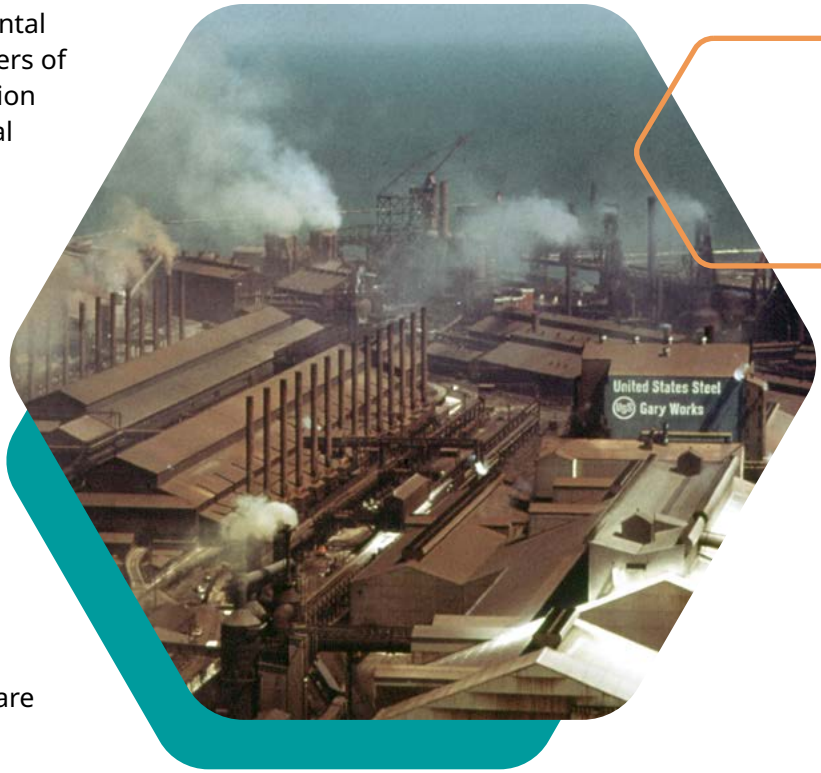
Initially, this acquisition was seen generally by the investors as a good opportunity to gain access to the U. S. market with its world-leading demand for high-grade steel, and to take advantage of a favourable policy environment rewarding industrial decarbonisation. However, in August 2024, as part of efforts to smooth the troubled acquisition process, Nippon Steel pledged an additional 1.3 billion USD investment in the U. S. Steel's coal-based fleets.[32]

In a commitment letter addressed to U. S. Steel employees in December 2024, the company announced its intention to reline and upgrade the two blast furnaces at Mon Valley and four at Gary Works by 2030 to "ensure their long-term, stable operation."[33] This move, aimed in part at winning union support and easing concerns on the U. S. Steel side, undermines Nippon Steel's own climate commitments and stated vision for the future, as it reinforces reliance on coal-based blast furnace production and increasingly outdated business models.

This announcement spurred alarm amongst civil society organisations in the United States who voiced strong objections on the basis that Nippon Steel's plan would increase GHG emissions and air pollution, and run counter to the already significant progress being made in the country to decarbonise the industrial sector.

This relining investment announcement led to the Sierra Club, the oldest and largest grassroots environmental organisation in the United States, lobbying members of the United States Congress to oppose the acquisition on climate, job, and air pollution grounds. Regional environmental and public interest organisations near the U. S. Steel plants expressed their opposition to continued investments in blast furnaces to their representatives in the Congress, stating "*Nippon Steel's fixation on coal-dependence would be the death knell for U.S. Steel facilities*".[34]

As of the publication of this report, it remains uncertain whether the acquisition will ultimately be successful. While Nippon Steel positions itself as the "*right partner to ensure U. S. Steel is successful for generations to come as an iconic American company*", the plans to invest billions in prolonged coal use gives little reassurance that the needs of future generations are being taken seriously.[35]



U.S. Steel gary Works / Public domain

[30] **Nippon Steel**, *Acquisition of United States Steel Corporation*, 18 December 2023.
[31] **U. S. Steel**, *U. S. STEEL'S FOOTPRINT*, Retrieved on 2 May 2025.
[32] **Nippon Steel**, News Release, *Nippon Steel Announces Transformative Investments at U. S. Steel's Mon Valley Works and Gary Works,* 29 August 2024.Retrieved on 2 May 2025.
[33] **Japan Metal Daily**, *Nippon Steel / U.S. Steel acquisition / additional commitment announced / six operating blast furnaces to be relined for long-term use by 2030*, 11 December 2024.
[34] **Sierra Club**, *Sierra Club Urges Congress To Reject Nippon Steel's Threats*, 3 October 2024. Retrieved on 2 May 2025.
[35] **Nippon Steel**, News Release, *Statement about Acquisition of United States Steel Corporation*, 15 March 2024. Retrieved on 2 May 2025.

At the same time, the company stated *"the reduction of CO2 emissions from Nippon Steel parent company is the highest priority, as it accounts for 92% of the company's consolidated emissions and 82% of the group's total emissions, including equity-method affiliates."*[36] However, as Nippon Steel's goal of 100 million tonnes of global production includes overseas operations, its global responsibility is expected to increase in the future, requiring the company to be both clearer about its climate plans, and aligned with the 1.5C limit.

One other notable overseas asset is ArcelorMittal/Nippon Steel India (AM/NS India), a joint venture with ArcelorMittal, in which Nippon Steel holds a 40% stake. AM/NS India is building two blast furnaces scheduled to start operation in 2026, and this project has received financing from Japanese megabanks.[37] Once completed, AM/NS India's steel production capacity will jump from 9 Mtpa to 15 Mtpa.

On top of this, AM/NS India is applying for environmental clearance for three greenfield steel plants which would total seven new blast furnaces (see Table A2 in Annex). While not all of these projects will necessarily become reality, AM/NS India has demonstrated its ambition to reach 40 Mtpa production capacity, and the plant projects presented so far show that all the additional capacity is to be based on coal-reliant BF-BOF technology.

AM/NS India has only a limited emissions intensity target for 2030, and no 2050 net zero target. **Nippon Steel needs to address its overseas joint ventures and other companies without leaving them with inadequate decarbonisation efforts.** Nippon Steel should introduce transformative zero-emission technologies to achieve carbon neutrality by 2050 in all of its operations, and not build new or take measures to extend the lifespan of existing blast furnaces.

2. Assessment of Nippon Steel's climate targets

Since SteelWatch published its first Corporate Climate Assessment of Nippon Steel in May 2024,[38] the company's climate targets have remained unchanged. Nippon Steel's 2030 climate target, set back in 2021 and only aiming for a 30% reduction in absolute CO2 emissions against a 2013 baseline, has not been revised despite lacking science-based verified alignment with a 1.5C climate scenario. 2013 was a year of historically high emissions in Japan, so using this year as a baseline gives an impression of deeper reductions. Had the baseline been fiscal year 2017 or 2018 as some other global steelmakers have chosen, achieving the same 2030 emissions target would have only required a reduction of approximately 23%.

Decarbonisation by downsizing

Regarding progress towards achieving its 2030 target, in fiscal year 2023 Nippon Steel reported 76.5 Mt of CO2 emissions (scope 1 and 2) - just 4.1 MtCO2 above the target.[39] Although it is close to achieving this, there are two major caveats.

First, the majority of reductions come from cutting capacity, not cutting emissions intensity. Nippon Steel itself states 84% of its CO2 emissions reductions by 2030 are expected to come from lower steel production, with the remaining 16% (5 Mt of CO2) to come from lowering the carbon intensity of its steel production - a more genuine measure of decarbonisation progress.[40] A reduction in carbon intensity, and therefore evidence of genuine decarbonisation, is yet to be seen as this indicator has barely budged in the past years.

Second, its most CO2 intensive global equity-method affiliates, in particular, AM/NS India, are not included in this 2030 target (30% cut from 2013) or in these reported emissions in the Integrated Report 2024. Therefore, it is deceptive to label the progress as 'overachievement', rather than 'underambition'.

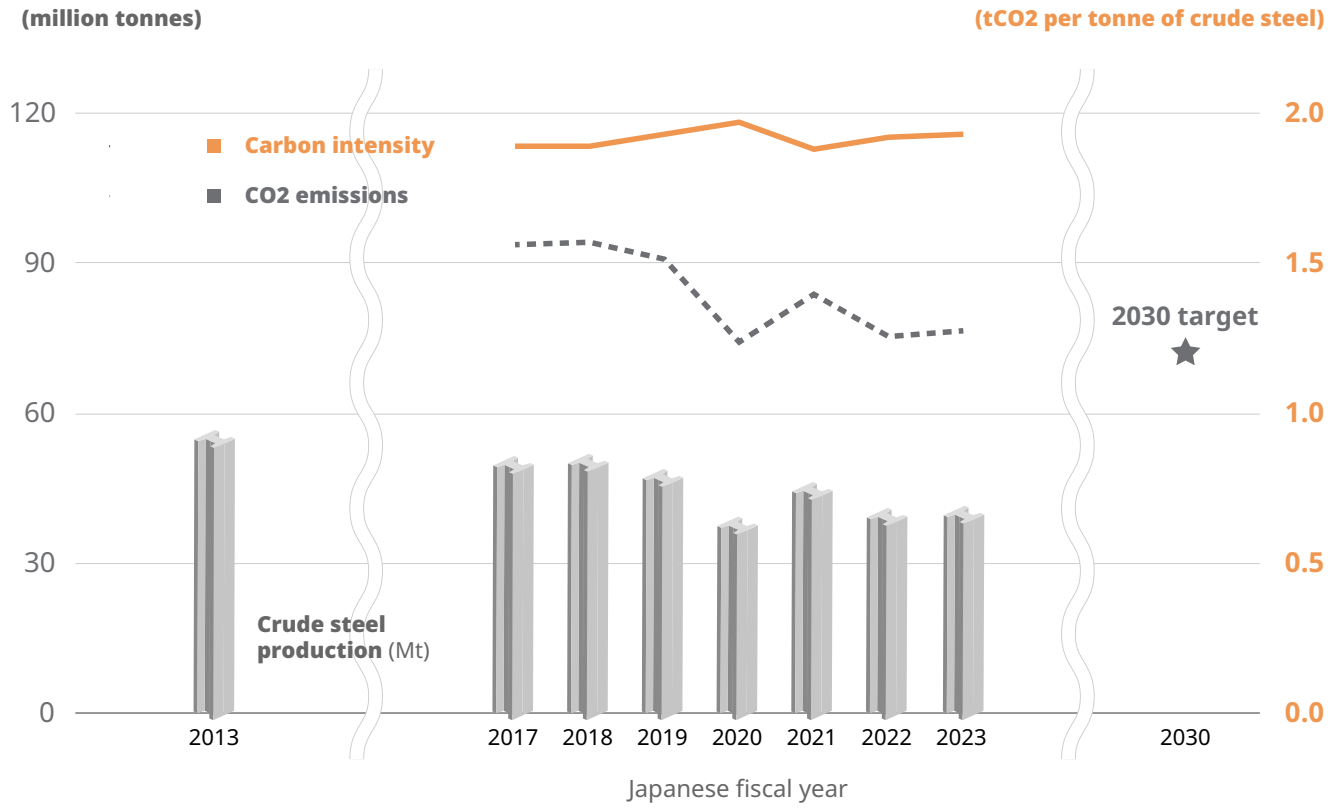
[36] **Nippon Steel**, *Nippon Steel's Green Transformation (GX) Initiatives,* p.63, 13 March 2025.
[37] **NIKKEI Asia**, *Nippon Steel India JV to receive $5bn in Japanese loans for expansion*, 31 March 2023. Retrieved on 2 May 2025.
[38] **SteelWatch**, *Too Little Too Late Corporate Climate Assessment of Nippon Steel 2024*, 31 May 2024.
[39] Exact emissions targets vary depending on the considered organisational boundaries. Here, the following apply: Nippon Steel and associated EAF mills (Osaka Steel, Sanyo Special Steel, Nippon Steel Stainless Steel, Oji Steel, Tokai Special Steel, Tokyo Kohtetsu, Nippon Steel Structural Shapes Corporation, Ovako, Sanyo Special Steel Manufacturing India, and Standard Steel).
[40] **Nippon Steel**, *Nippon Steel's Green Transformation (GX) Initiatives,* p.17, 13 March 2025.

This demonstrates an urgent need for Nippon Steel to set a carbon intensity target, especially considering its expansionist agenda. Continued steel production with an emissions intensity of over two tonnes of CO2 per tonne of steel produced is simply too high to meaningfully contribute towards the decarbonisation of the steel sector, international Paris-aligned climate targets, or even Japan's own national goals.

As Nippon Steel itself admits, 84% of its CO2 emissions reductions by 2030 are expected to come from lower steel production, with the remaining 16% (5 Mt of CO2) to come from lowering the carbon intensity of its steel production — a more genuine measure of decarbonisation progress.[41] **This demonstrates an urgent need for Nippon Steel to set a carbon intensity target.** As a matter of fact, a reduction in carbon intensity, and therefore evidence of genuine decarbonisation, is yet to be seen as this indicator has barely budged in the past years (see Figure 5).

As Nippon Steel itself states, 84% of its CO2 emissions reductions by 2030 are expected to come from lower steel production, with the remaining 16% to come from lowering the carbon intensity of its steel production — a more genuine measure of decarbonisation progress.

Figure 5: Evolution of Nippon Steel crude steel production, CO2 emissions and carbon intensity



Sources: *Nippon Steel Integrated Report 2024*, p. 85. *Nippon Steel Sustainability Report 2023*, p. 20. *Nippon Steel Sustainability Report 2022*, p. 20. Organisational scope: Nippon Steel and associated EAF mills (Osaka Steel, Sanyo Special Steel, Nippon Steel Stainless Steel, Oji Steel, Tokai Special Steel, Tokyo Kohtetsu, Nippon Steel Structural Shapes Corporation, Ovako, Sanyo Special Steel Manufacturing India, and Standard Steel). Emissions scope: scope 1 and 2.

CO2 emissions reductions through downsizing might be sufficient for Nippon Steel to reach its current 2030 climate target, but pursuing this option further might soon hit the wall.

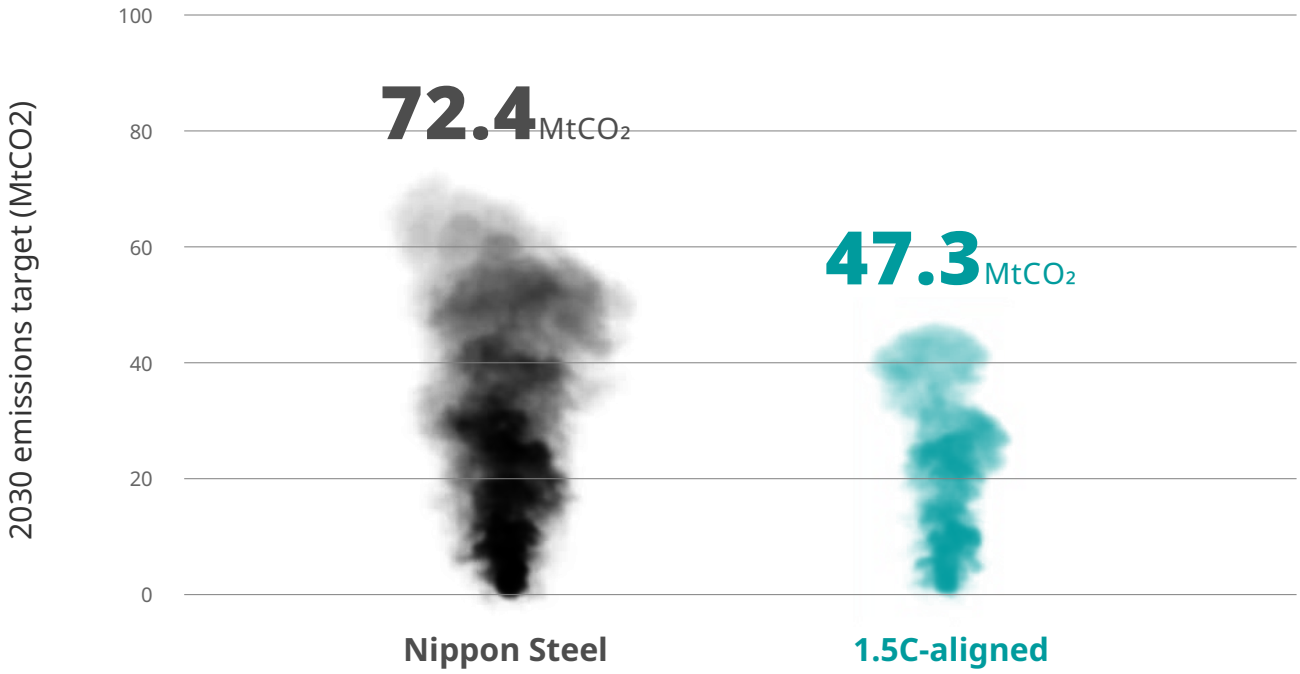
[41] **Nippon Steel**, Nippon Steel's Green Transformation (GX) Initiatives, p.17, 13 March 2025.

Japan's NDC updated, the gap with the steel industry's climate target widens

In February 2025, Japan submitted its revised Nationally Determined Contribution (NDC) to the United Nations under the Paris Agreement,[42] setting new mid-term targets to achieve a 60% GHG emissions reduction by 2035, and a 73% reduction by 2040 compared with 2013 levels. This builds upon a 46% reduction target for 2030 which was adopted in 2021.

While these country-level targets fall short of what a 1.5C-aligned climate scenario requires,[43] **the new 2035 and 2040 targets nonetheless increase the pressure on Nippon Steel and the rest of the Japanese iron and steel industry to increase their ambition to enable the country to honour its international commitments.**

Figure 6: Alignment of Nippon Steel's 2030 target with 1.5C scenario



Note: The 1.5C-aligned 2030 target was determined by applying a 48% reduction to the 2019 emissions level, reflecting the recommendations from IPCC, Climate Change 2023: Synthesis Report. Summary for Policymakers, 2023, doi:10.59327/IPCC/AR6-9789291691647.001.

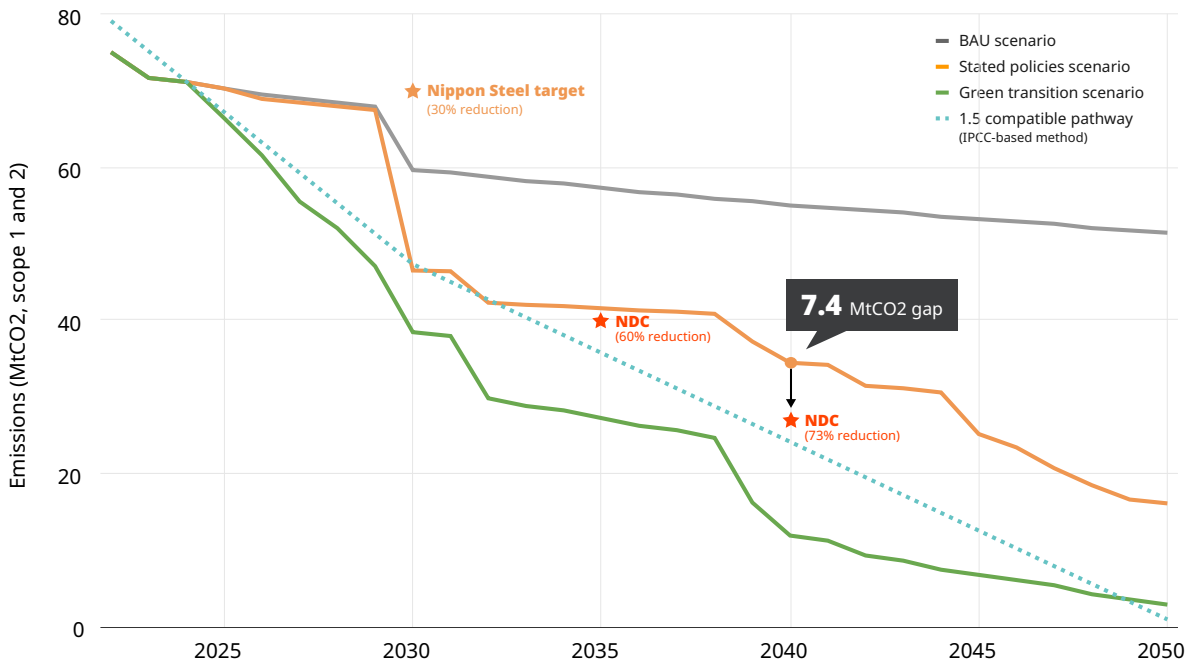
Back in 2021, when Nippon Steel set its 2030 target, it committed itself to a smaller effort (-30%) than the entire Japanese society (-46%). If it decides this time to adopt 2035 and 2040 targets at the same level as Japan's, that would mean a reduction of respectively 62.0 and 75.9 Mt CO2 against the 2013 baseline.

If 72.4 Mt CO2 in 2030 is taken as the starting point, Nippon Steel would have to cut 44.4 Mt CO2 of annual emissions between 2030 and 2040. All else being equal, if it were to achieve this through the same combination of downsizing (84% of the reduction effort) and lower carbon intensity (16% of the effort) as in the current period, it would have to further decrease its annual steel production by 16.9 Mt — more than the maximum output of 2 entire steel plants with 2 blast furnaces like Kimitsu and Kyushu Oita. Nippon Steel would then most likely no longer rank among the world's top five largest steelmakers.

Realistically, Nippon Steel cannot just rely on downsizing and does plan to replace part of the capacity lost by the closure of blast furnaces and lower utilisation of basic oxygen furnaces with electric arc furnaces. The company also plans to start implementing its COURSE50 technology around 2030, and H2-DRI and Super COURSE50 technologies around 2040. **However, even if fully successful, the implementation of COURSE50 starting from 2030 would not be sufficient to meet a CO2 emissions reduction target of 73% by 2040, with an estimated gap amounting to 7.4 Mt CO2.**

[42] **Ministry of the Environment, Government of Japan**, *Japan's Nationally Determined Contribution (NDC)*, 18 February 2025.
[43] **Climate Acton Tracker**, *Japan 2035 NDC*, 11 November 2024. Retrieved on 2 May 2025.

Figure 7: Modelled trajectory of Nippon Steel CO2 emissions under three scenarios and comparison with a 1.5C-aligned pathway and Japan's 2035 and 2040 NDC targets



Note: this model only considers Nippon Steel Corporation (excluding associated EAF mills and overseas assets). Therefore, historical and modelled CO2 emissions levels might slightly differ from some used elsewhere in this report where different organisational boundaries are applied.

Transparency and disclosure improvements

In other areas Nippon Steel has begun new initiatives which address some of the other shortcomings of its climate target and emissions reporting pointed out by SteelWatch last year.

The company discloses its consolidated emissions, which include emissions from the parent company, consolidated subsidiaries, and major equity-method affiliates (with the latter reported proportionally based on ownership share).[44] This is an encouraging move toward greater transparency. In addition, Nippon Steel reiterated its group-wide emissions reduction targets in investor materials released in March 2025.[45]

Critically, the company announced a change in the handling of CO2 emissions from subsidiaries. This is significant as the company moves towards having a majority of its production abroad.[46] Nippon Steel has expressed its commitment to supporting the development of climate targets and strategies not only for each overseas subsidiary, but also in collaboration with joint venture partners for their respective operations.[47] This is all the more crucial given that ArcelorMittal/Nippon Steel India, in which Nippon Steel has a 40% stake, is quickly building up a lot of new coal-based ironmaking and steelmaking capacity which fall outside Nippon Steel's climate targets and has no 2050 net zero target of its own (see Table A2 in Annex).

Nippon Steel has also begun to disclose volumes of scrap steel used which is a step towards greater transparency.[48] Regarding scope 3 emissions, the company said it interviewed its major suppliers of iron ore and coking coal to get more accurate emissions data.[49] It is also "*considering introducing a target for* [scope 3] *CO2 reduction*".[50]

SteelWatch also explained in its previous Nippon Steel Corporate Climate Assessment that not all technological options pursued by the company have the same decarbonisation potential, and the timeline for their implementation is incompatible with a 1.5C-aligned climate scenario.[51] The next section demonstrates that this remains valid today.

[44] **Nippon Steel**, *Nippon Steel's Green Transformation (GX) Initiatives,* p.64, 13 March 2025.
[45] ibid.
[46] ibid.
[47] **Statement made at the "GX Briefing Session"** held on 13 March 2025.
[48] **Nippon Steel**, *Nippon Steel Integrated Report 2024*, p. 93, September 2024.
[49] **Nippon Steel**, *Nippon Steel Integrated Report 2024*, p. 86, September 2024.
[50] **Nippon Steel**, *Nippon Steel's Green Transformation (GX) Initiatives,* p.66, 13 March 2025.
[51] **SteelWatch**, *Too Little Too Late Corporate Climate Assessment of Nippon Steel 2024*, May 2024.

3. Assessment of technological choices and decarbonisation pathways

Nippon Steel's "*empty decades*"

The 2020s and 2030s are the critical transition period for decarbonising the steel industry. However, **Nippon Steel illustrates that there is currently no clear path to deploy viable technologies and has indicated that achieving significant emissions reductions will remain difficult until around 2040.**[52] Its multipathway roadmap is heavy on its own novel research and development over the next 15 years, with only limited emission reductions and decarbonisation technology deployment before 2040.

Nippon Steel's 2050 carbon neutrality target[53], announced in March 2021 and its subsequent decarbonisation roadmap, have hardly been updated since. However, the world around the company is rapidly changing.

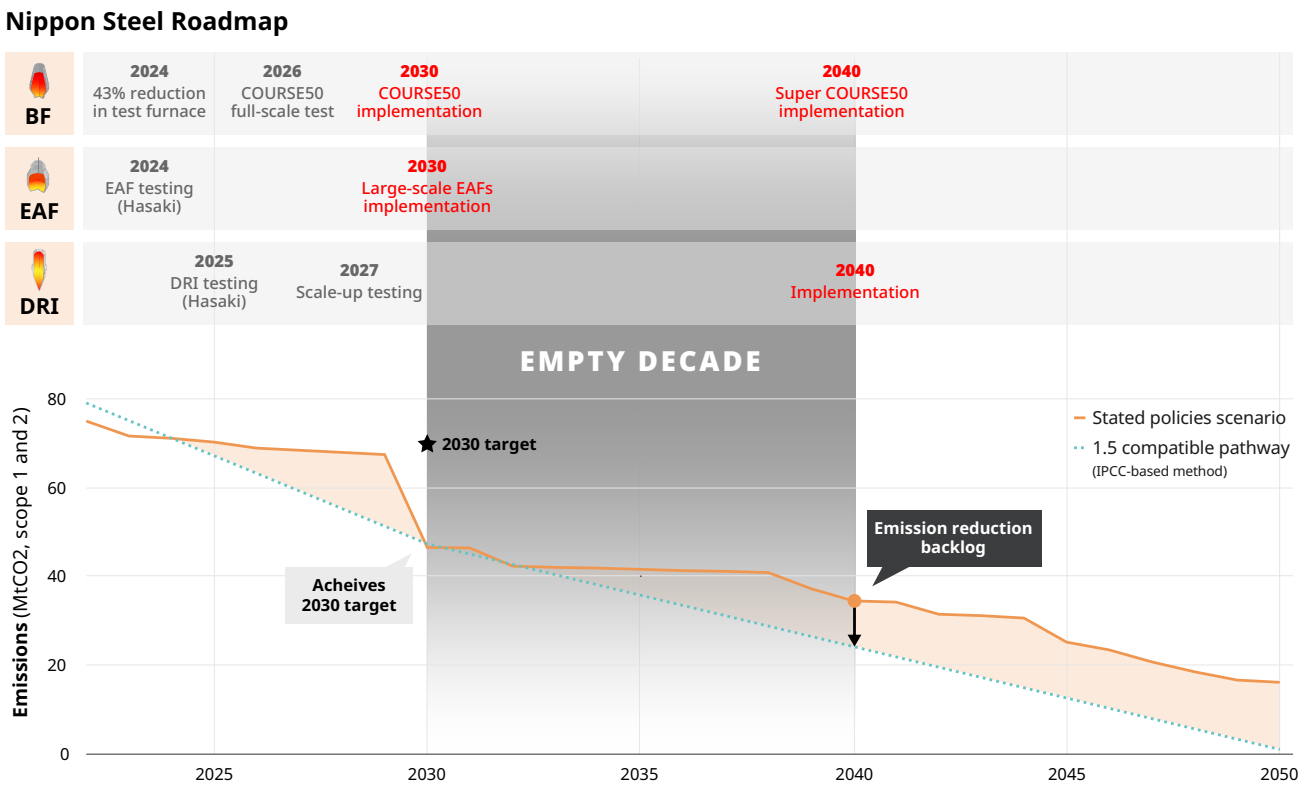
The race by steelmakers to deploy available low-emissions technologies is now underway from Europe to China, to Korea, and to the United States. This is occurring alongside the development of additional technologies. While there will be more options post-2040, there are decarbonisation options today.

It is quite possible to diversify Nippon Steel's portfolio beyond coal-based production, particularly through targeted investments in green hydrogen-based iron production outside Japan. The world's first near-zero emissions iron and steel production is expected to begin at commercial scale within the next two years, as we discuss later in this chapter.[54]

In Nippon Steel's *Carbon Neutral Vision 2050*, the company outlined a "*multipathway approach*" which is a combination of various technological options.[55] The pillars of this approach are composed of:

- Innovation of blast furnace process (COURSE50 and Super COURSE50)
- Technical development of H2-DRI
- Transition to large-scale electric arc furnaces.

Figure 8: Nippon Steel roadmap and CO2 emissions



Note: This model only considers Nippon Steel Corporation (excluding associated EAF mills and overseas assets); assumes full implementation of large-scale EAF and COURSE50 by around 2030, Super COURSE50 and DRI by around 2040.

[52] **Nippon Steel**, *Nippon Steel's Green Transformation (GX) Initiatives,* p.64, 13 March 2025.
[53] **Nippon Steel**, Carbon Neutral Vision 2050
[54] **Stegra**, *Our Boden plant*. Retrieved on 2 May 2025.
[55] **Nippon Steel**, *Breakthrough technology development to decarbonize steelmaking processes*. Retrieved on 2 May 2025.

Its multipathway roadmap is heavy on its own novel research and development over the next 15 years, with only limited emission reductions and decarbonisation technology deployment before 2040.

Nippon Steel Kimitsu Works
SteelWatch

The company is overinvesting in the least-promising technologies and risks falling behind global rivals in deployment.

Following the establishment of new EAFs and the implementation of COURSE50, Nippon Steel has no further plans for the deployment of decarbonisation technologies until approximately 2040, **resulting in an "empty decade" of largely flat emissions**.

Interim targets and milestones are necessary for smooth sailing in uncharted waters

Nippon Steel's 2050 carbon neutrality target represents a clear expression of its intent to address climate change and provides a long-term vision to guide the company's decarbonisation. However, in light of the worsening climate crisis, what matters most is not the end goal but how much the company will reduce its cumulative emissions over the next 25 years. To this end, it is critical to clarify which technologies will be used, by when, and to what extent total emissions reductions will be achieved.

While Nippon Steel is currently investing in and developing multiple technological options, many remain at the research stage. The company has yet to indicate milestones or benchmarks on how it will deploy these technologies, and what level of emissions reductions they will likely achieve.

This approach, in some respects, reflects Japan's corporate culture, where publicly announcing a goal on what has not yet been "proven" is seen as making a false promise. While Nippon Steel's approach may be seen as a rational risk-avoidance strategy in the face of technological uncertainty, the vagueness also risks casting doubt externally on the company's seriousness and concrete plans about climate action. It also perpetuates the idea that the tech for near-zero steel is not ready, when this is not the case looking at Nippon Steel's international competitors.

To dispel concerns, **a future revision of Nippon Steel's decarbonisation roadmap needs to set interim emissions reductions targets beyond 2030, alongside milestones, cost, production or other benchmarks for each of the different paths** in its strategy. Not only would this provide clarity within the company and its stakeholders but it would also send powerful signals to the market as to the company's direction which could drive a new wave of investment.

Nippon Steel has previously set similar benchmarks ahead of concrete implementation plans, but these have been disproportionately connected to coal-based production. For example, these include the company's targets to increase crude steel production outside Japan to 60 million tonnes per year, to double its reserves of coal and iron ore, to reduce emissions from blast furnaces by 50% through hydrogen injection, and working with industry and government to set a target price for hydrogen in Japan.[56]

[56] **Nippon Steel**, *Breakthrough technology development to decarbonize steelmaking processes*. Retrieved on 2 May 2025.

Similar milestones and benchmarks are needed for the other pathways in its multipathway approach, such as for the costs of green hydrogen production outside Japan, targets for access to DRI-grade iron ore, production targets for H2-ready and H2-DRI iron, green iron (HBI) imports to Japan, cost and technology targets for smelters and more.

Failing to present a concrete emissions reduction plan until new technologies are developed and deployed is a risky strategy. Delayed implementation is risky for the climate, overspending the remaining carbon budget available to the steel industry globally, and increasing the likelihood of catastrophic warming.

It is also risky to invest in technology that prolongs the use of outdated blast furnaces, while rivals from Europe to North America to China deploy available decarbonisation technologies, leaving Nippon Steel struggling to compete in a rapidly decarbonising world. The company should consider a risk mitigation strategy to not rely only on its own R&D but to also use technologies available today, as well as those which will become available over the next decade.

Super COURSE50 rebrand - too little, too late

At the Japan Pavilion of COP29 in November 2024, the Japan Iron and Steel Federation stated, "*The global steel industry will eventually be fully hydrogenated and electrified for carbon neutrality*".[57] While the commitment to transition toward hydrogen and electricity-based production is welcome, the key concern lies in the ambiguity of the term "*eventually*", which lacks a clearly defined timeline.

In practice, continuing to rely on coal-based blast furnace production beyond 2050, while building new blast furnaces in its joint venture in India leaves Nippon Steel stuck on a high-carbon pathway into the latter half of the century.

Its efforts to inject hydrogen into blast furnaces keeps its coal-based operations polluting marginally less, for a lot longer, while its multi-billion investments in coal mining projects in Australia and Canada further commit the company to coal dependence. It is therefore essential for the company to clarify when and how this transition will take place, with a concrete and credible roadmap.

As a leading global steelmaker, Nippon Steel bears the responsibility not only to decarbonise its own operations, but also to contribute to emissions reductions across its global value chain, including Scope 3.

In order to reduce CO2 emission from blast furnaces in Japan, Nippon Steel and other steelmakers, with support from the Japanese government, began the "COURSE50" project in 2008.[58] The project aims to achieve a theoretical 30% reduction in CO2 emissions, with a 10% reduction from partially replacing coal with hydrogen within the blast furnace and another 20% by separating and capturing CO2 from the byproduct gas. After 17 years of R&D, Nippon Steel will launch a demonstration of actual equipment in a large-scale blast furnace (approximately 400 times the size of the test furnace) in 2026, and intends to implement COURSE50 in actual production in FY2030.[59]

However, due to COURSE50's limited CO2 reduction capacity and clear inadequacy to contribute to Japan's net zero targets, the Japanese steel industry, including Nippon Steel, began promoting a next generation of technological development called "Super COURSE50". This approach aims to cut blast furnace emissions by 50% through increased use of hydrogen, with the remaining emissions to be offset through a combination of measures such as CCUS.[60]

Nippon Steel announced in December 2024 that it achieved a 43% reduction in CO2 emissions in a small-scale test blast furnace.[61] Furthermore, achieving only a 50% reduction is far from net zero, which is required to combat climate change.

[57] **The Japan Iron and Steel Federation**, *JISF will host the COP 29 side event at the Japan Pavilion "Pathways toward steel decarbonization - Green Steel leading the Green Transition-*. Retrieved on 2 May 2025.
[58] **GREINS**, *COURSE 50 technology*. Retrieved on 2 May 2025.
[59] **Nippon Steel**, *Nippon Steel's Green Transformation (GX) Initiatives,* p.16, 13 March 2025.
[60] **Japan Iron and Steel Federation**, *JISF Long-term vision for climate change mitigation- A challenge towards zero-carbon steel*, September 2019.
[61] **Nippon Steel**, News Release, *Establishment of technology to reduce CO2 emissions in blast furnaces using hydrogen Achieved world's first 43% reduction in CO2 emissions in a test furnace, reaching the development goal ahead of schedule,* 20 December 2024. Retrieved on 2 May 2025.

Moreover, while Nippon Steel stated that in 2023 it participated in a feasibility study to capture CO2 from its plant in Kyushu Oita and transport it to an offshore storage site,[62] the results of this study and the level of performance of CO2 capture are unknown. To date, there is no commercial-scale CCUS installation globally achieving high capture rates on BF-BOF plants, nor concrete and detailed projects to get there.[63]

The Japanese government has invested significant public funding into the COURSE50 and now Super COURSE50 project through NEDO initiatives,[64] and more recently through the Green Innovation Fund.[65] However, deeper emissions reductions using hydrogen are not expected to be commercialised until the end of the 2030s, with widespread adoption projected for the 2040s. The technical feasibility and high cost of carbon capture may pose insurmountable barriers to widescale deployment. Furthermore, the availability of hydrogen in Japan at a competitive price is highly uncertain. For these reasons, reliance on COURSE50 and Super COURSE50 create a risk of emissions lock-in from blast furnaces into the 2040s, and a gap between this reality and the government's new interim targets of a 60% reduction by 2035 and 73% by 2040.

Box 1: What does "Hydrogen Reduction" actually mean?

Nippon Steel is currently using the terms "*blast furnace hydrogen reduction*" and "*hydrogen reduction steelmaking*" in its own technology roadmap. However, the term is very unclear because, depending on the context, it can refer to both "*hydrogen injection into the blast furnace*," which is an emissions reduction measure that reduces coal usage at blast furnaces, and "*hydrogen direct reduction iron making (H2-DRI)*," which is a distinct process using completely different technology.

While the company's "*Carbon Neutral Vision*" distinguishes between the two, recent external communications often refer to both simply as the "*development of hydrogen reduction technology*," which can be misleading to the general reader. As mentioned above, hydrogen injection into blast furnaces has limited CO2 reduction potential as the blast furnaces continue to require large amounts of coal to operate. On the other hand, through H2-DRI, only hydrogen is needed to drive the reduction process, not relying on coal use. When using renewable energy-derived hydrogen it can reduce emissions from the steelmaking process to nearly zero.

What Nippon Steel and other steelmakers should aim for is 'full' hydrogen reduction through H2-DRI, without any use of coal, and it must be clearly distinguished from hydrogen injection, which poses a significant risk of extending the life of the current blast furnaces. Nippon Steel should avoid confusing or misleading readers by being transparent about which technology each "hydrogen reduction" on the roadmap refers to, and how much of an emissions reduction effect it will have.

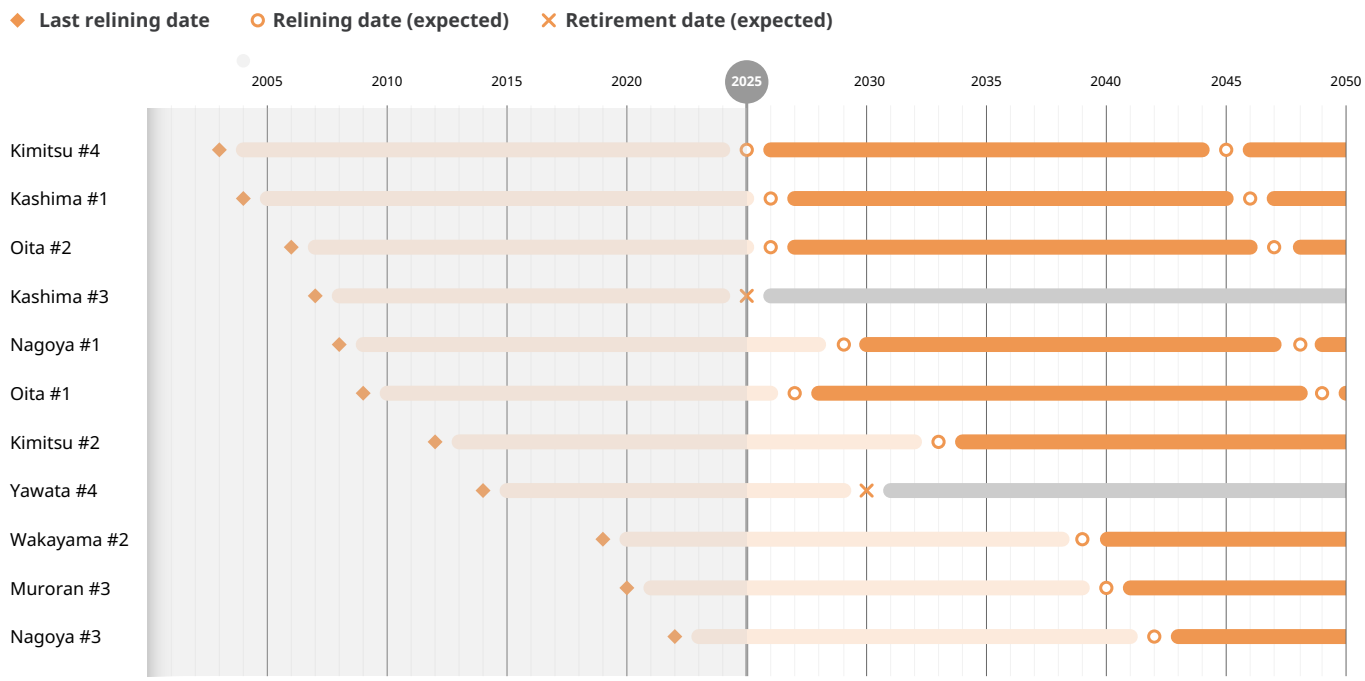
Blast furnace relining decisions imminent, yet no transition plan

Currently, nearly all of Nippon Steel's blast furnaces will reach the end of their operational lifespans and require relining before 2040. Despite this, the company has not presented a clear schedule for phasing out its blast furnaces or a concrete transition plan toward DRI or EAF production. Its current roadmap indicates that blast furnaces with SuperCOURSE50 will continue to operate in 2050, and it only indicates a planned decommission of one of the two blast furnaces in Kashima Area (Ibaraki). Therefore, it can only be assumed for now that its remaining blast furnaces will remain in operation throughout the 2030s and beyond.

Nippon Steel may indeed have more robust transition plans in mind, but its lack of public clarity represents a critical issue from a standpoint of accelerating decarbonisation. Unless technology shifts and capital investments are planned and implemented in line with the retirement timeline of existing blast furnaces, achieving substantial emissions reductions will be difficult. **There is a high risk that the company will fail to meet its 2050 net zero target and face significant business risks in the future.**

[62] **Nippon Steel**, News Release, *Seven Companies Announce to Conduct Engineering Design Work for Japanese Advanced CCS (Carbon Capture and Storage) Project,* 4 September 2024. Retrieved on 2 May 2025.
[63] **Institute for Energy Economics & Financial Analysis,** *Carbon capture for steel?*, 17 April 2024. Retrieved on 2 May 2025.
[64] **Challenge Zero**, *Course 50 Project*. Retrieved on 2 May 2025.
[65] **The government of Japan**, The Road to Net Zero with Green Steel, March 1, 2024. Retrieved on 2 May 2025.

Figure 9: Estimated relining timeline for Nippon Steel's blast furnaces



Note：Prepared by SteelWatch based on last relining dates published by Nippon Steel, *Outline of the Manufacturing Base*, July 2023. Reduction to 10 blast furnaces in 2025 (closure of Kashima BF No. 3 already announced) and to 9 in 2030 (according to Nippon Steel's targets). Blast furnaces are assumed to be relined on a 20-year cycle. No more than one relining is expected to occur in a given year to maintain production continuity.

Hydrogen direct reduced iron (H2-DRI) - stalled at the starting line

One of the most promising alternatives to ironmaking in blast furnaces is hydrogen direct reduction ironmaking (H2-DRI), in which iron ore is directly reduced with hydrogen. In Europe, large-scale demonstrations are underway with the aim of commercialisation starting from 2026.

Production of this "*green iron*" has the potential to upend today's steel supply chains as ironmaking is shifted to regions with both abundant and affordable renewable energy resources and iron ore. The resulting iron can be transported as hot briquetted iron (HBI), and then brought to Japan for steelmaking. Regions with high potential for green iron production for export include Australia, Brazil, Canada and the Middle East.

When recently questioned, Nippon Steel has stated it is considering HBI options. The company is yet to release a multipathway approach to DRI, with no announced plans to produce DRI using available technology outside Japan or to purchase direct reduced iron from other producers. Due to high costs of imported LNG and likely high costs for hydrogen produced in Japan or shipped to Japan, HBI will be critical to the decarbonisation of the company's production in Japan and could be the basis of many positive opportunities for expansion outside Japan. **It is necessary for any revised climate plan to set targets and milestones for green iron production and green iron imports.**

Box 2: Iron ore grades and expanding H2-DRI

Nippon Steel has been engaged in the research and development of hydrogen-based reduction technologies using low-grade iron ore, which is generally considered unsuitable for current DRI methods. Following its selection for funding under NEDO's Green Innovation Fund in December 2021, Nippon Steel signed a memorandum of understanding with Vale in April 2022 to collaborate on research into DR iron,[66] and in March 2024, entered into a supply agreement with Tenova for a hydrogen-based DRI demonstration plant based on Energiron.[67]

[66] **Nippon Steel**, News Release, *Nippon Steel Corporation and Vale Sign Memorandum Regarding Decarbonization Solution*, 26 April 2022. Retrieved on 2 May 2025.
[67] **Tenova**, *ENERGIRON® for Experimental DRI Plant in Japan*, 18 March 2024. Retrieved on 2 May 2025.

Nippon Steel has since announced plans to install a small-scale pilot shaft furnace with a capacity of one tonne per hour in 2025, followed by a larger-scale demonstration in 2027. However, commercial deployment is not expected until after 2040.[68]

DRI can be produced today using higher-grade iron ores, by purifying lower-grade iron ore (beneficiation) or by adding a smelting furnace step. The Institute For Energy Economics And Financial Analysis (IEEFA) notes that "*the global steel sector is still largely focused on existing coal-consuming blast furnace operations, giving iron ore miners an incentive to continue producing blast furnace-grade iron ore, rather than ores with higher iron content used for direct reduction (DR-grade)*."[69] This highlights the importance of steelmakers sending a clear demand signal for higher-grade iron ore suitable for DRI.

Nippon Steel does not plan to commercialise hydrogen-based DRI (H2-DRI) until the late 2030s, citing the challenge of using low-grade iron ore for hydrogen reduction as its top priority. Despite the existence of commercially available technologies that use high-grade iron ore, the company characterises such technologies as "unproven" and remains focused on its own R&D to adapt these technologies to low-grade ores.

DRI shift accelerates

The world's major steelmakers are clearly of a different mindset to Nippon Steel, and are already accelerating their shift to direct reduction steelmaking. Energiron, for example, has been producing H2-DRI at large scale (> 1 Mtpa) for over a decade in plants[70] in the United States, Egypt, and the UAE (using fossil gas), and H2-DRI the technology behind the HYBRIT pilot plant in Sweden which has demonstrated the feasibility of green hydrogen-based DR iron production and steelmaking in an EAF to deliver near-zero-emissions steel.[71] In Germany, Salzgitter[72,73] and Stahl-Holding-Saar (SHS)[74] are also building DRI plants that will replace existing blast furnaces by 2030.

Nippon Steel's roadmap stands out for its prolonged R&D phase and delayed implementation. According to Nippon Steel's plan, H2-DRI will finally be available in the 2040s, while its competitors are aiming for commercialisation from the late 2020s to the early 2030s, and this difference will directly affect its future competitiveness.

SSAB, which is advancing the HYBRIT project, has drawn attention for its bold shift away from blast furnaces toward hydrogen-based direct reduction. While it is true that Nippon Steel is much larger than SSAB, and therefore faces challenges of a different scale, SSAB demonstrates that by setting clear and ambitious decarbonisation goals, it is possible to attract strategic partners and secure both social and economic support.

Nippon Steel, with its technological and financial resources, could also set these trends. In order to maintain its global competitiveness, the company must move beyond a stance of "*waiting for technologies to mature*" and instead adopt a leadership role in driving the transformation of the steel sector.

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[68] **Nippon Steel**, *Nippon Steel's Green Transformation (GX) Initiatives,* p.29, 13 March 2025.
[69] **IEEFA**, *Iron ore quality a potential headwind to green steelmaking – Technology and mining options are available to hit net-zero steel targets*, 28 June 2022.
[70] **ENERGIRON**, *Solutions*. Retrieved on 2 May 2025.
[71] **HYBRIT**, *Fossil-free steel production ready for industrialisation*, August 2024.
[72] **Steel Times International**, *SHS Group announces contracts for 'Europe's biggest decarbonization project'*, 11 October 2024, Retrieved on 2 May 2025.
[73] **Danieli**, Order for the supply of a new 2.1 Mtpy, hydrogen-ready DRI plant in Germany, 24 May 2023, Retrieved on 2 May 2025.
[74] **thyssenkrupp**, *thyssenkrupp Steel presents key points for future industrial concept*, 25 November 2024, Retrieved on 2 May2025.

No time for caution

In response to global trends, Nippon Steel has taken a cautious approach to adopting the H2-DRI process in-house. This caution may in part stem from the company's intention to leverage its own technological capabilities and establish a proprietary process, rather than combining its technological choices with external technology providers.

However, as a global company facing competition to produce low-emissions steel and a shared challenge with climate change, there is also a need to align with international momentum to reduce emissions sooner, and commercially. Simultaneously exploring existing technology within its "*multipathway approaches*" is also a rational strategy as there is no guarantee the company's R&D will succeed or be cost-competitive as other companies are also working to develop similar technologies.

It will be important for Nippon Steel to not only continue its in-house development, but also consider collaboration with international frontrunners and overseas demonstration projects, in order to present a less risky, more concrete and more effective decarbonisation pathway.

While Nippon Steel's EAF steelmaking capacity in Japan is currently planned to remain relatively small during this decade, the fact that Nippon Steel nonetheless plans to use DR iron during this decade without concrete plans to build its own DR iron production capacity, suggests it would source DR iron from external suppliers. These suppliers are very likely to be located outside Japan as there is currently zero DR iron production in Japan, and renewable energy constraints remain a challenge.

After all, in 2023, media reported that Nippon Steel was considering a 700 million USD investment in a green steel project "*powered by hydrogen*", with "*Australia and Brazil among possible sites*". But this is yet to materialise. If the company no longer envisages the development of such a project itself, it can cooperate with other companies which are actively working on it, such as Fortescue.

Box 3: Emerging green iron supply chain

In contrast, South Korea shares the same resource limitations as Japan. POSCO, the country's largest steelmaker, announced in 2022 plans to build a HBI manufacturing plant in Port Hedland, Western Australia, with commercial operations scheduled to begin in 2028.[75]

In 2025, the company secured a 15 million AUD grant from the Western Australian government to support the project.[76] While the initial phase will use natural gas as the primary reducing agent, POSCO plans a gradual transition to green hydrogen.[77] The project will utilise Midrex technology, but POSCO is also developing a new technology called "*HyREX*," which enables the use of lower-grade hematite ores, and intends to deploy this technology in Port Hedland in the future.[78] Regarding the HyREX technology, POSCO has announced its goal to complete the research project for the H2-DRI process by 2028 and commercialize it by 2030.[79]

To secure green hydrogen supply, the company is conducting a joint feasibility study with ENGIE (France) on a hydrogen production project near Perth, aiming to establish a local production and supply system of 20,000 to 40,000 tonnes annually, with commercial production targeted to begin in 2028.[80] Other companies are vying to develop green hydrogen and HBI in South Australia. Japanese companies are also beginning to take action. Kobe Steel (KOBELCO) is exploring the commercialisation of HBI production and sales in Oman,[81] while JFE Steel has signed a memorandum of understanding for collaboration to build a supply network for DR iron in the UAE.[82]

[75] **Gloabal Energy Monitor**, *POSCO Port Hedland Steel Plant.*
[76] **SteelWatch**, *What's next for Japanese companies? POSCO leads the way in green iron investment*, 11 March 2025. Retrieved on 11 April 2025.
[77] **ABC News**, *Multi-billion-dollar South Korean investment could make Port Hedland a green iron centre*, 16 December 2023.
[78] **Port Hedland Iron**, Opportunity, Retrieved on 2 May 2025.
[79] **POSCO GOURP NEWSROOM**, *[Great Conversion to Low-carbon Steelmaking Process] HyREX*, 2 June 2022.
[80] **Hydrogen Central**, POSCO Holdings Takes First Step in Developing 40,000 Tons of Green Hydrogen Production in Western Australia, 19 October 2023.
[81] **KOBELCO**, *Kobe Steel to accelerate feasibility study of Low-CO_2 Iron Metallics Project in Oman*, 10 April 2023. Retrieved on 11 April 2025.
[82] **JFE Steel**, *JFE Steel, Itochu, Emirates Steel Arkan & Abu Dhabi Ports Group Sign MOU to Establish a Supply Chain of Ferrous Raw Material for Green Ironmaking with Low Carbon Emission*, 18 July 2023. Retrieved on 11 April 2025.

Will it harness green iron opportunity?

Although cost analyses are scarce with significant variables, a new report from Deloitte and WWF Australia estimates that producing green steel in Japan using imported green iron from Australia would be 34% cheaper (per tonne of steel) than producing green steel in Japan with green iron made locally from imported iron ore and ammonia as a hydrogen carrier.[83]

In a promising move, in December 2024 Nippon Steel and Sojitz Corporation, a major Japanese trading company, jointly acquired a 49% stake in Champion Iron's Kami iron ore project in Canada to potentially develop a mine capable of producing approximately nine million tonnes of high-grade iron ore suitable for DRI each year.[84] Potential for producing low-emissions iron, which can be transported to steel plants elsewhere, is high but so far under-exploited in Canada[85].

While these are positive investments for the future, the company still lacks concrete plans to utilise this ore for DR iron production. Nippon Steel stated at the GX briefing in March 2025, "*the shaft furnace will not necessarily be introduced in Japan. Various candidate locations can be considered, such as places where hydrogen is easily accessible. However, the core technology will be developed in Japan*".[86]

Nippon Steel already invests in upstream iron ore mines and could expand these investments to include direct reduction in regions favorable to H2-DRI, such as Australia, Canada, and the Middle East.

Exploring green iron trade should become a more prominent part of a multipathway approach to DRI, and the company must change its "*wait until the technology is mature*" attitude if it is to keep up with what is happening in the global marketplace. If Nippon Steel remains focused only on its own R&D, it will lose the opportunity to show leadership and get ahead by scaling H2-DRI's commercialisation.

Transition to EAFs and scrap use

As a means of moving away from coal blast furnaces, conversion to electric furnaces is an approach that can have an immediate effect with existing technology. It is also a future-ready investment as it can both operate using recycled steel (scrap), and pellets produced via direct reduction.

As part of its current decarbonisation strategy, Nippon Steel is introducing large-scale electric furnaces, and by the end of 2022, it had constructed and began operations of a new large electric furnace in the Setouchi Works, Hirohata area in Hyogo. In 2024, Nippon Steel also announced plans to shut down one blast furnace at the Yawata Works and replace it with a large electric furnace, as well as an additional electric furnace being added to the Hirohata area[87].

Furthermore, its group company Nippon Steel Stainless Steel's Yamaguchi Works has announced plans to restart a dormant electric furnace.[88] If these projects are implemented, at least three electric furnace sites will be in operation within the Nippon Steel Group by around 2030, and the ratio of electric furnaces to crude steel production is expected to increase.

The currently planned conversion of Hirohata and Yawata to electric furnaces is a major step forward, but it is still insufficient for its own zero emission targets. The summary report of the "*Green Steel Study Group for GX Promotion*," launched by Japan's Ministry of Economy, Trade and Industry (METI) in late 2024, also emphasises the need for a fundamental transformation of production processes in the steel industry to advance decarbonisation.[89] In parallel, the Japanese government has begun to actively support the transition from blast furnaces to EAFs

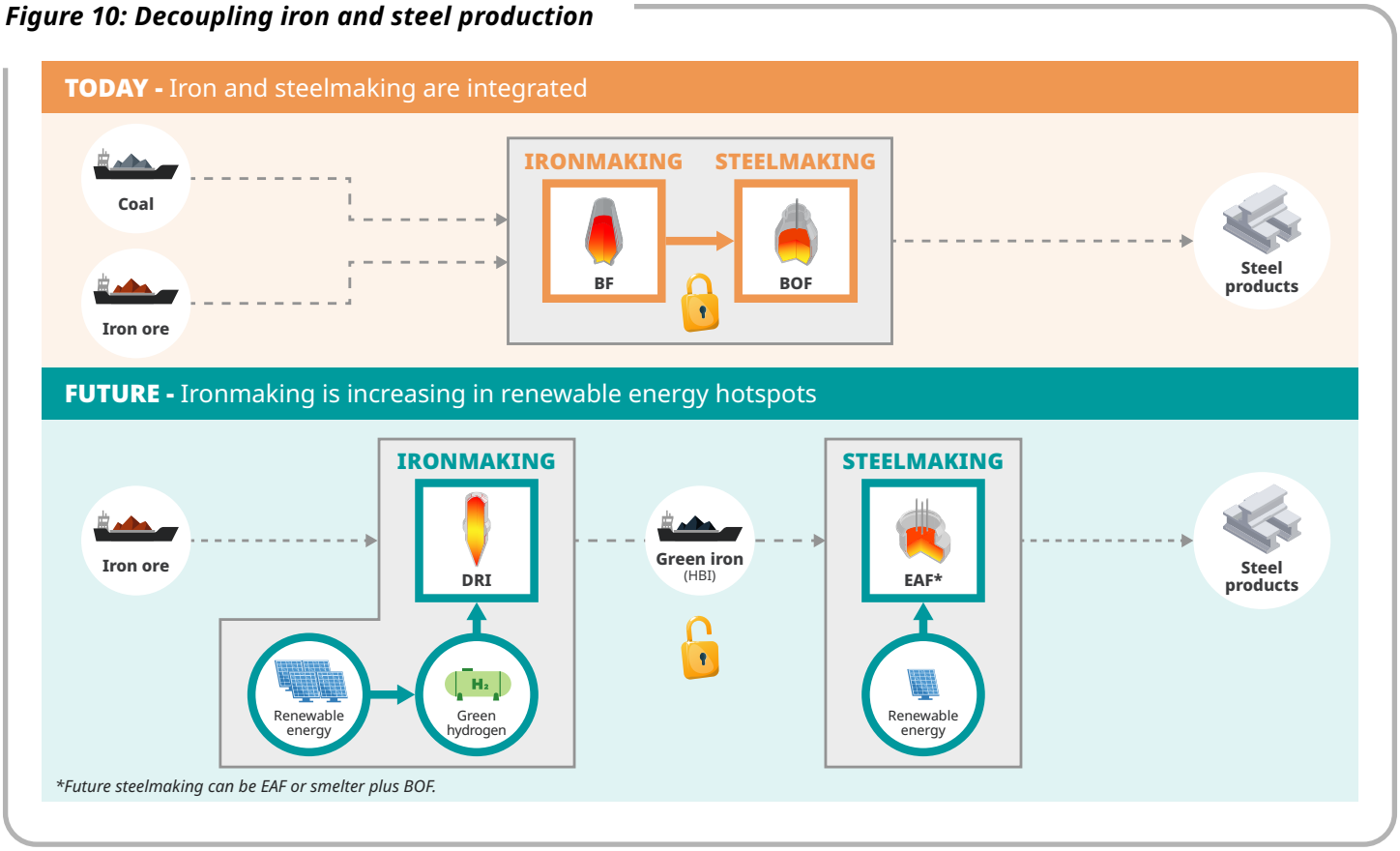
[83] **WWF-Australia, Deloitte**, *Forging Futures: Changing the nature of iron and steel production*, p.14, March 2025.
[84] **Nippon Steel**, Acquisition of Interests in the Kami Iron Ore Project in Canada and Master Agreement on Joint Venture Establishment, p.4, 19 December 2024. Retrieved on 11 April 2025.
[85] Algers & Bataille (forthcoming). Strategic decarbonisation of the Canadian iron and steel industry: A worker-centred path to cut emissions, increase value added and strengthen global supply chains, 2025. University of Lund, ISBN 978-91-86961-65-7.
[86] This statement was made during the concluding Q&A session of the "GX Briefing" held on 13 March 2025.
[87] **https://gmk.center/en/news/nippon-steel-has-applied-for-a-subsidy-to-build-new-eafs/**
[88] **Nippon Steel**, *Decision is Made to Apply for Government Support Based on the GX Promotion Act for the Conversion from the Blast Furnace Steelmaking Process to the Electric Arc Furnace Steelmaking Process*, 11 October 2024.
[89] **Ministry of Economy, Trade and Industry**, *Study Group on Green Steel for Green Transformation (GX) to be Launched*, 23 January 2025. Retrieved on 11 April 2025.

through the GX Promotion Act and subsidy programs.[90,91] Nippon Steel now can harness these opportunities, and present concrete milestones for site-by-site transitions in the roadmap.

As the government intensifies efforts to promote the transition to EAFs, Nippon Steel's strategy for securing green iron is becoming an increasingly important consideration in assessing Nippon Steel's business strategy and climate action.

Unlike steelmaking in basic oxygen furnaces which tend to be coupled with ironmaking blast furnaces in integrated plants, steelmaking EAFs can be standalone installations and can accept a wider range of iron inputs: recycled iron and steel (scrap), pig iron (ore-based iron made in a blast furnace) and DR iron (ore-based iron made through the DRI process).

Figure 10: Decoupling iron and steel production



Nippon Steel seems to acknowledge the growing importance of iron sourcing as in April 2025 it announced the establishment of a dedicated division named "*Steel Scrap, HBI & Pig Iron General Planning*", and announced it would adopt "*a comprehensive strategy for procurement, utilisation, inventory management, and logistics of raw materials in order to optimise procurement and material blending on a Group-wide basis*".[92]

Nippon Steel is explicit in its plans to produce "*high-grade steel*" in EAFs with DR iron during this decade.[93] However, for the moment, the company does not produce any DR iron, does not have any commercial-scale DRI production plants globally, and does not have announced plans to import DR iron, as elaborated in the section above.

Decisions deferred, climate action delayed

Nippon Steel has consistently maintained that it cannot include in its public targets or plans anything that is not technically or practically feasible at this time.

However, with very limited time left to tackle climate change, the company's focus on coal in its so-called

[90] **Ministry of Economy, Trade and Industry**, *Business Adaptation Plan (under the Industrial Competitiveness Enhancement Act)*, 26 February 2025. Retrieved on 11 April 2025.
[91] **Ministry of Economy, Trade and Industry**, *Subsidy for the Introduction of Clean Energy Vehicles*, 20 February 2025. Retrieved on 11 April 2025.
[92] **Nippon Steel**, *Nippon Steel's Green Transformation (GX) Initiatives,* p.23, 13 March 2025.
[93] **Nippon Steel**, *Nippon Steel's Green Transformation (GX) Initiatives,* p.12, 13 March 2025.

"*multipathway approach*" is leading to critical decisions being delayed, and critical technologies sidelined. In today's context, what is required by the urgency of climate change is a willingness to act on every opportunity.

Even if technologies are not yet fully commercialised, companies must begin piloting and committing to pathways forward. To address growing concerns over the 'empty decades' between today and the 2030s, of delayed decarbonisation and limited emissions reduction, Nippon Steel must demonstrate a more proactive and transparent commitment to climate action.

Revising its decarbonisation roadmap and laying out concrete plans that place a phase-out of coal-based iron and steelmaking at its strategic core.

4. The rising green steel market and Nippon Steel's response

Nippon Steel cannot achieve decarbonisation through its efforts alone. A broader transformation involving the entire industry, along with strong policy support and market-shaping efforts from government and society and support from buyers, is essential. This chapter outlines the labelling and lobbying approach of Nippon Steel in the context of the market mechanisms and policy interventions needed to accelerate the decarbonisation of the steel sector.

Globally, steel consumers are increasingly prioritising the decarbonisation of their supply chains, and in Japan, both the government and private sector are working to establish a "*green steel*" market. The most important issue is how "*green*" is defined to ensure that premiums reward steelmakers who have invested in low-emissions steel as part of a company-wide transition plan.

Designation of steel as low-emissions should be for steel actually produced using low-emissions production methods rather than reduced through credits, certificates of reductions from other process improvements, or external offsets and part of a corporate-wide strategy for reaching near-zero emissions. To be a credible contribution to decarbonisation of the sector, it must be fully scalable.

For example, SteelWatch recognises ResponsibleSteel's level 3 and level 4 products as credible. Low-emissions green steel must not be produced from high emissions-intensity methods that have incorporated only marginal emissions reductions and been 'greened' with addition of a certificate of CO2 savings made somewhere else. In any green labelling, certificates of emissions cuts done elsewhere by the company should be kept separate from the actual climate footprint of the product. Such certification should be transparent about the nature of the reduction, traceable to the production location, and independently verified.

Mass balance accounting tricks

Nippon Steel has taken a different approach. To satisfy demand for buyers, in the absence of current production of actual low-emissions steel, the company, along with the Japan Iron and Steel Federation, have promoted an accounting-based approach to emissions reductions and green steel labelling.[94]

This system Nippon Steel calls "*mass balance*" method involves allocating emission reductions achieved through in-house CO2 reduction projects, at any point within the company's steel production chain to specific steel products.

The company has stated it aims to scale up supply of such low-carbon steel to 10 million tonnes by 2030,[95] and as part of this effort, has introduced a mass balance-based product line called "*NS Carbolex Neutral*." This product allows CO2 reductions achieved at specific facilities — such as the shift from a scrap melting process (SMP) to EAF production at the Setouchi Works (Hirohata Area), or increased use of scrap in steelmaking[96] — to be credited to any steel product, regardless of where or how it was actually produced.[97]

[94] **Ministry of Economy, Trade and Industry**, *Green Steel for GX*, p.34, January 2025.
[95] **Reuters**, *Nippon Steel to launch low-emission steel products next year*, 14 September 2022. Retrieved on 11 April 2025.
[96] This information was obtained through a direct inquiry submitted via the official form on **Nippon Steel**'s NSCarbolex Neutral product page.
[97] **Nippon Steel**, News Release, *Sales Launch of "NSCarbolex™ Neutral"*, Retrieved on 14 September 2022. Retrieved on 11 April 2025.

The emission reductions may be assigned to steel that is actually made using iron from a blast furnace, even when this emits over two tonnes of CO2 per tonne of steel produced. By 'attaching' emissions reduced elsewhere, this steel becomes labelled as green. Nippon Steel needs to ensure transparency and traceability as to how and where the steel was actually produced so as not to mislead buyers.

The mass balance method is useful to a company that makes small emissions cuts (e.g. 10%) across its overall fleet, and wants to sell a small share of its product to satisfy demand from a niche 'green' market. If all company-wide emissions cuts are put into a few products, they can be sold as near-zero emission. But this marketing strategy is not useful if a company is truly decarbonising its entire fleet to near-zero emissions. That company would want green steel premiums to be attached to physically low-emission steel.

Lobbying for false balance

Nippon Steel states it is lobbying to loosen international standards — from the World Steel Association Green Steel Guidelines to ISO standards and SBTi — to enable the green steel label to be attached to steel with a corporate-level mass balance certificate. This, if successful, potentially puts the mass balance certified product on equal footing to steel produced in actual low-emissions facilities. If both can be labelled as 'green', then both can secure a green premium from buyers.

Domestically, the introduction of public procurement policies and automotive subsidy programs by the government has been welcomed as a positive step toward promoting low-emissions steel. Demand-side incentives matter to encourage the transition. But the current system allows certain incentives for steel products that are labelled green based on a mass balance calculation, not physically low emissions, and Nippon Steel alongside other blast furnace steelmakers are lobbying for this to become standard.

This would reduce the incentive for steelmakers that are willing to make investment decisions today on new and deep decarbonisation technologies such as H2-DRI. The next decade is key in deploying commercial scale H2-DRI. Steelmakers need premiums to justify these new final investment decisions in low emissions production and the scaling-up of green steelmaking technologies. Nippon Steel's lobbying could undermine the market and harm incentives for deep decarbonisation.

Decarbonising the steel sector cannot be achieved by individual companies alone — it requires a broader societal shift, including energy and industrial policy reform. Deepening constructive dialogue around Nippon Steel's decarbonisation roadmap, while recognising the role the company can play and exploring avenues for support and collaboration, will be critical to advancing a net-zero society. Although decarbonisation presents challenges in terms of cost and technological uncertainty, it also offers opportunities to unlock new markets. To drive this transition forward, it is essential to build the foundation for a sustainable green steel market through both institutional frameworks shaped by government, academia, and industry, and proactive product innovation by companies themselves.

Nippon Steel's headquarters in Tokyo, Japan.
Greg McNevin / SteelWatch

Steel buyers, especially in the high-value automotive sector, also have a critical role to play by demanding green steel made from alternative production methods, paying a premium for it and urging the steelmakers to hasten this production rather than relying on virtual reductions through mass balance.

Essar Steel Plant (now ArcelorMittal Nippon Steel India), June 2012. Photo: Kalish Giri via Flickr (CC 2.0)

Conclusion

Four years have passed since Nippon Steel announced its "*Carbon Neutral Vision 2050*". For the first time since then, the company articulated the breakdown of the source of its emissions reductions and its future outlook. Disappointingly, the company announced that 84% of emission reductions by 2030 would come from downsizing production capacity, and only a marginal reduction will come from cutting emission intensity.

This trajectory does not match what is expected of the world-leading steelmaker. Moreover, as a company with a highly ambitious global growth strategy, it is contradictory to place bets on emissions reductions via reduced production capacity and it is further worrying as the company intends to keep coal-based blast furnaces as part of its future fleet. This will likely result in a loss of competitiveness in today's rapidly greening global market. In the face of the climate crisis, the company's published roadmap calls for only modest emissions intensity reductions before the 2030s.

The company's "*multipathway approach*" presents options but lacks specific plans on which technologies are deployed when. The focus is on research rather than on decision-making and driving action. The "*empty decades*" ahead result from this lack of concrete plans. The one thing that is clear during the same period is that the company will strengthen its coal reliance.

Deploying COURSE50 and Super COURSE50 in blast furnaces cannot achieve net zero, leaving the time spent pursuing them wasted from a decarbonisation perspective. The company's investment in EAFs and its emphasis on iron procurement, including scrap, is a welcome move. However, this will only become a true pathway to net zero with the company concretely moving towards the production or procurement of DR iron using renewable-based hydrogen.

Under its current scenario, by around 2040, emissions are expected to decline, but this will be too little, too late.[98] Even with the full deployment of the currently planned decarbonisation technologies by 2040, it will still be insufficient to achieve net-zero emissions. This pace is inconsistent with the Japanese government's national targets of 60% reduction by 2035 and 73% reduction by 2040, and the company could prevent Japan from achieving its overall climate goals.

The company's recent active lobbying activities to further cement "mass balance" methodology as a legitimate 'green steel' definition, are worrying accounting tricks, and suggest a long term plan for a slow or partial decarbonisation, not the radical business transformation.

When announced, Nippon Steel's Carbon Neutral Vision 2050 was among many companies that had set 2050 net-zero targets, but had not yet set out interim targets or concrete action plans. Four years have passed since then, and Nippon Steel has yet to clarify the outstanding issues left unresolved in its original roadmap.

[98] **SteelWatch**, *Too Little Too Late Corporate Climate Assessment of Nippon Steel 2024*, May 2024.

SteelWatch encourages Nippon Steel to revise its roadmap and address the following questions with concrete actions:

- What is the phase-out date for blast furnaces?
- What is the phase-out date for coal mining investments?
- What are the company's benchmarks for carbon intensity reductions in 2030, 2035 and 2040?
- What low-emissions technologies will the company deploy between 2025 and 2040?
- What is the company's deployment strategy and benchmarks for H2-DRI, beyond R&D for direct reduction of low-grade iron ore?
- What is the company's strategy and targets for procuring hydrogen DR iron from locations where H2-DRI is more economically feasible?

Nippon Steel needs to hasten a strategic shift from coal to hydrogen-based production and prepare for the expected increase in demand for green steel materials if it is to secure a competitive advantage without missing out on business opportunities.[99]

While shifting from long-standing blast furnaces to green steel technology such as DRI will require a big adjustment to its mindset. Nippon Steel cannot afford to be weighed down by its long history. The crisis we face demands radical thinking, and what may feel like uncomfortable urgency.

Unlike the coal industry, which has a future of terminal and necessarily rapid decline ahead, the steel industry has a critical role to play in building a zero-emission society at a much accelerated pace.

"*Empty decades*" of vague options must be replaced by clear decisions, concrete steps and a strategy, in both Japan and overseas, that ends coal-based steelmaking and sets the industry on a cleaner, brighter path.

Nippon Steel Kimitsu Works
SteelWatch / FINE Co.,Ltd.

[99] The expected shift towards greater reliance on iron imported from overseas, especially if purchased from external producers, highlights once more the necessity to cap scope 3 emissions under robust climate targets in order to avoid GHG emissions outsourcing business opportunities.

Annexes

Table A1: Long-term reduction target of subsidiaries and equity-method affiliates

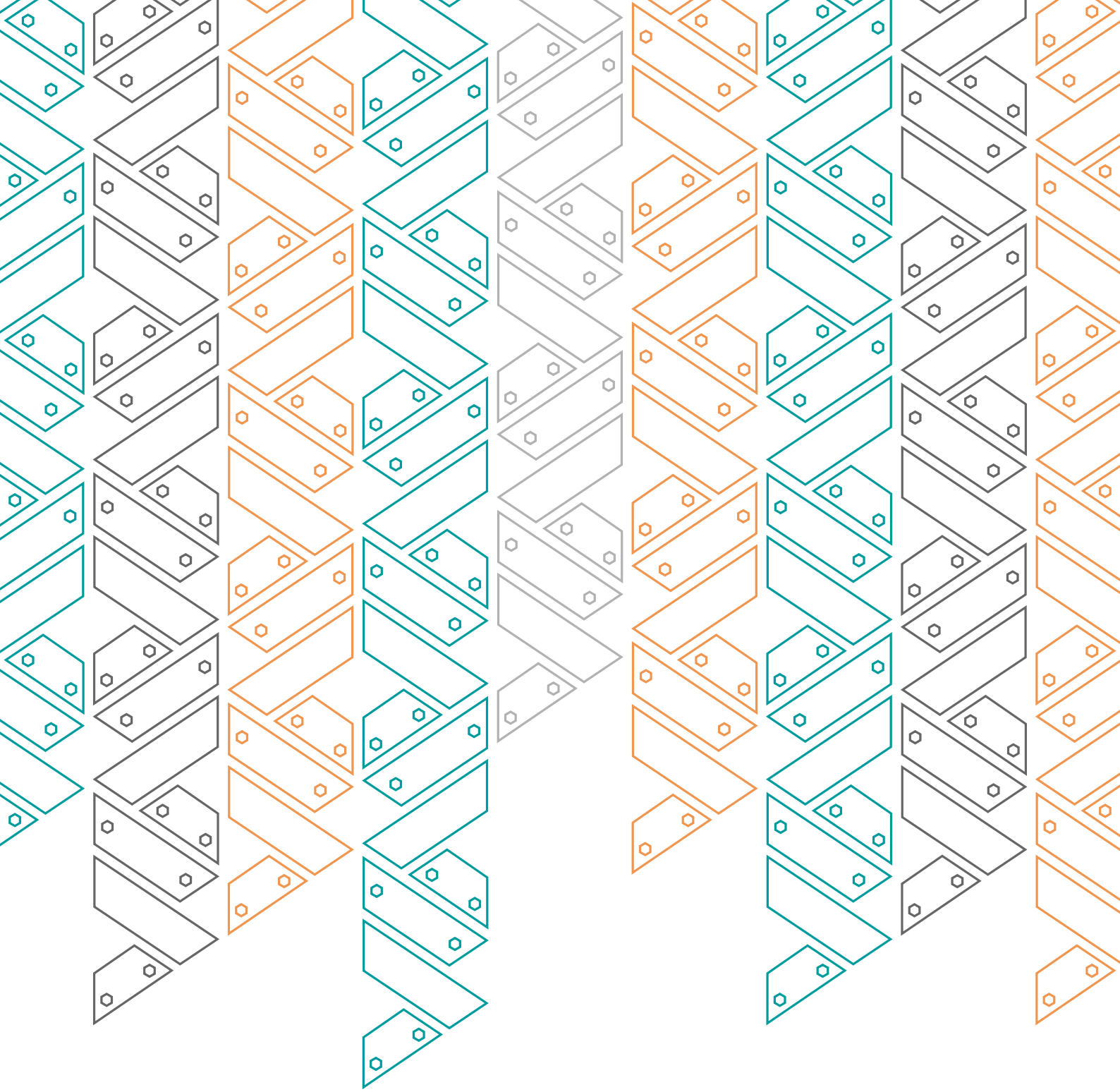
			CO2 reduction targets
Domestic	Nippon Steel		2050 carbon neutral
	Subsidiary	Nippon Steel Stainless Steel	
		Nippon Steel Structural Shapes Corporation	
		Sanyo Special Steel	
		Osaka Steel	
		Tokyo Kohtetsu	
		Oji Steel	
	Equity-method affiliates	Godo Steel	
		Topy Industries	
		Mitsubishi Steel Muroran	
Overseas	Subsidiaries	Ovako	90% cut by 2040 (vs 2015)
		Standard Steel	
		Sanyo Special Steel Manufacturing India	2050 Carbon neutral
		GSteel GJS	
	Equity-method affiliates	AM/NS India	
		USIMINAS	

Table A2: ArcelorMittal/Nippon Steel India's aggressive growth plans

Plant / project and location	Crude steel production capacity (in Mtpa)	Technology and equipment	Status / timeline
Hazira existing plant (Gujarat state)	8.8	1 BF (2.4 Mtpa) 8 DRI (8.4 Mtpa in total) 8 EAF (9.0 Mtpa in total)	Operating
Hazira - expansion (Gujarat state)	6.0	2 BF (7.0 Mtpa in total) 3 BOF (6.0 Mtpa in total)	Under construction with production to start in 2026
Paradeep (Odisha state)	7.0	2 BF (7.4 Mtpa in total) 3 BOF (7.0 Mtpa in total)	Applying for environmental clearance
Kendrapara (Odisha state) - phase 1	14.0	3 BF (14.4 Mtpa in total) 6 BOF (14.7 Mtpa)	Applying for environmental clearance
Kendrapara (Odisha state) - phase 2	10.0	No detailed plan yet	No detailed plan at this stage
Rajayyapeta (Andhra Pradesh state) - phase 1	7.0	2 BF (8.0 Mtpa in total) 3 BOF (8.6 Mtpa in total)	Applying for environmental clearance
Rajayyapeta (Andhra Pradesh state) - phase 2	10.0	No detailed plan yet	No detailed plan at this stage

Sources: Paradeep, Kendrapara, Rajayyapeta.

Note: only ironmaking and steel equipment is listed. Not all the planned projects will necessarily be realised.



Title: *No Time For Caution: Nippon Steel Corporate Climate Assessment 2025 Update*

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.

Description: This report is an update to our original report, Too Little Too Late: Corporate Climate Assessment of Nippon Steel, published in May 2024.

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