

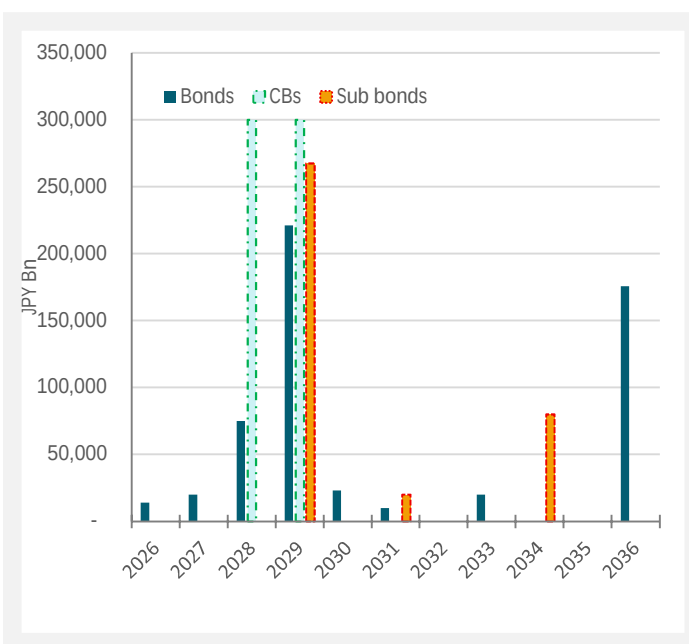
Nippon Steel: decarbonisation path as a credit story

Rose Choy* | 29 Oct 2026 | 18-minute read

SUMMARY

- Nippon Steel's June 2025 acquisition of U.S. Steel has more than doubled its leverage, leaving it with less financial flexibility
- The company has also committed to USD10.8bn of capital investments in the US for the next three years
- Given the tight financial headroom, how capital is allocated will determine the company's economic future and transition pathways
- The company will need to refinance maturing debt, which gives lenders an engagement opportunity

Figure 1. Nippon Steel bond maturities until 2036 (includes U.S. Steel)
Source: Bloomberg Finance L.P., accessed 23 Oct 2026. *Note: Convertible bonds are included at put and maturity dates; Subordinated bonds are included at first call date.



Nippon Steel acquired 100% of U.S. Steel in June 2025 for USD14.9bn. The acquired assets now account for roughly one-third of the group's asset base, and balance sheet leverage has more than doubled. In addition, Nippon Steel is committed to making USD10.8bn of capital investments in the US by 2028 and USD3bn beyond that year. The acquisition has reduced financial room to manoeuvre, even as management targets a BBB or higher credit rating to preserve funding capacity.¹

Management's choice between extending the life of its traditional Blast Furnace/ Blast Oxygen Furnace (BF/BOF) technology and accelerating investments in Electric Arc Furnace (EAF) and Direct Reduced Iron (DRI) equipment will shape Nippon Steel's carbon and economic pathways. For bondholders, these pathways are entwined, and key to the company's capital-allocation decision making.

This paper assesses Nippon Steel's post-acquisition credit profile and explores how capital allocation will impact its credit and transition pathways,² to support investor engagement. Due to Nippon Steel's likely refinancing needs, bondholders will have a role to play in financing its transition. Through direct engagement on capital allocation, business strategy, and decarbonisation, accelerated transition can also improve the company's future credit quality and so protect investments.³

¹ "Q1 FY2026 Appendix", Nippon Steel, 4 Aug 2026.

² Focused on U.S. Steel and Japanese domestic businesses, which generate 61% of FY25 revenues.

³ To explore AFII's toolkit for effective engagement please see "[Bondholder engagement toolkit](#)", AFII.

Credit implications of U.S. Steel acquisition

In June 2025, Nippon Steel completed its acquisition of U.S. Steel's shares with the Trump administration's approval for USD 14.9bn. The US government retains a non-voting golden share for key decisions including plant closures, production cuts, and job transfers. The acquisition was primarily debt funded via JPY2trn (~USD13.9bn) of bridge loans in 2025.

After the 2025 acquisition, S&P downgraded Nippon Steel's long-term foreign credit rating by a single notch from BBB+ to BBB with a negative outlook, while Moody's kept its Baa2 rating.⁴ Total debt increased from JPY2.5trn in March 2025 to JPY5.2trn in March 2026. FY24 (March 2025-end) revenues were JPY8.7trn versus FY25 revenues of JPY 10trn. Since March 2026, Nippon Steel has repaid its JPY2trn bridge loans with JPY600bn of convertible bonds, JPY900bn of JBIC co-financing with other Japanese banks and JPY500bn of subordinated loans. The company also earmarked asset sales of over JPY100bn in FY26 via sales of strategic shareholdings. Debt to EBITDA rose to about 4.1x for FY25, up from 1.6x in FY24.⁵ With current leverage elevated, and having pledged to de-lever to less than 3.5x Debt to EBITDA by FY2030, Nippon Steel will be focused on securing high near-term profitability and cost competitiveness.⁶

Figure 2. Nippon Steel consolidated debt structure.
Source: Nippon Steel, accessed 20 Oct 2026.

JPY Bn	FY24 3/31/25	FY25 3/31/26
Short term borrowings	167.5	167.1
Commercial Paper	40.0	15.0
Long term borrowings (Loans)	1,515.4	3,121.9
Bonds	680.6	1,723.7
Lease liabilities	104.0	146.6
Total	2,507.5	5,174.3

As part of the acquisition requirement, Nippon Steel is to invest USD10.8bn (~JPY1.7trn) into U.S. Steel through 2028 (with USD2.7bn scheduled for calendar year 2026; USD2.6bn for 2027, USD4.6 bn for 2028).⁷ Nippon Steel's consolidated FY23-25 annual capex averaged around JPY492.8bn for context. In Nippon Steel's medium-term business plan, FY26-30 capex and business investment are expected to reach JPY6trn over five years.⁸ Financial flexibility has decreased post U.S. Steel acquisition. The need to execute a technology transition and maintain short-term profitability for a cyclical business are key challenges for Nippon Steel.

Refinancing needs

The company faces potentially significant debt maturities in 2028-2029 depending on the outcome of its two convertible bonds and whether the company calls its subordinated notes. Its convertibles are: 0% due 2029 (ISIN: XS3298822258); conversion price JPY716.9; and 0% due 2031 (ISIN: XS3298822506); conversion price JPY723.5; puttable at 102.02% September 2028.

With Nippon Steel's share price at JPY654 (as of 23 October 2026), both convertibles are out of the money. Using each convertible's delta as a rough proxy for conversion probability, markets are currently pricing in approximately a 53-55% chance of equity conversion. This is a simplification, the actual valuation depends on

⁴ "Nippon Steel Downgraded To 'BBB' From 'BBB+' On Financial Burden Of U.S. Steel Acquisition; Outlook Negative", S&P Global, 17 July 2025.

⁵ "Beginning of a Partnership with U. S. Steel", Nippon Steel, 18 June 2025. Note subordinated notes/loans account for 50% equity credit according to rating agencies, hence leverage ratios take this into account.

⁶ "Q1 FY2026 Appendix", Nippon Steel, 4 Aug 2026.

⁷ "United Steel Corporation Fifth Amended and Restated Certificate of Incorporation", SEC, June 2025.

⁸ "Q1 FY2026 Appendix", Nippon Steel, 4 Aug 2026.

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factors including option time value, share price volatility, and credit spreads, all of which influence whether the 2031 convertible will ultimately be put back to the company in 2028 (see Figure 12 in the Appendix). Notably, rating agencies treat convertibles as 100% debt until converted, as the conversion option rests with the bondholder. If unconverted, both are senior obligations of the issuer.

Currently, about 63.5% of the company's total debt is comprised of loans, amounting to JPY3.3trn. Bonds — including straight debt, subordinated bonds⁹, and convertible bonds — are about 33% of total debt, or some JPY1.7bn. All the outstanding Nippon Steel bonds, including two green bonds¹⁰ and convertibles, are denominated in JPY, while U.S. Steel debt consists of USD senior notes, USD senior guaranteed notes (guaranteed by Nippon Steel), and Environmental Revenue Bonds — which are municipal bonds issued by the state where U.S. Steel has signed a loan agreement to pay all principal and interest to bondholders. The municipal authority bears no financial liability. Nippon Steel and US Steel's bond issues and details are shown in Table 1 in the Appendix.

Nippon Steel bond spreads

Nippon Steel CDS has been trading at a range of about 60-88bps in the last 12 months (as shown in Figure 4). This is below its peak of 91bps in May 2025 after the acquisition was announced/first approved. In Figure 3, red denotes subordinated bonds, while blue are the convertibles. The senior domestic Nippon Steel JPY bonds are relatively illiquid and trade at a spread of 40bps-75bps in the 2- to 10-year maturity bucket.

Figure 3. Nippon Steel JPY bond curve. Source: Bloomberg Finance L.P. accessed 26 Oct 2026. Subordinated bonds at 1st call date.

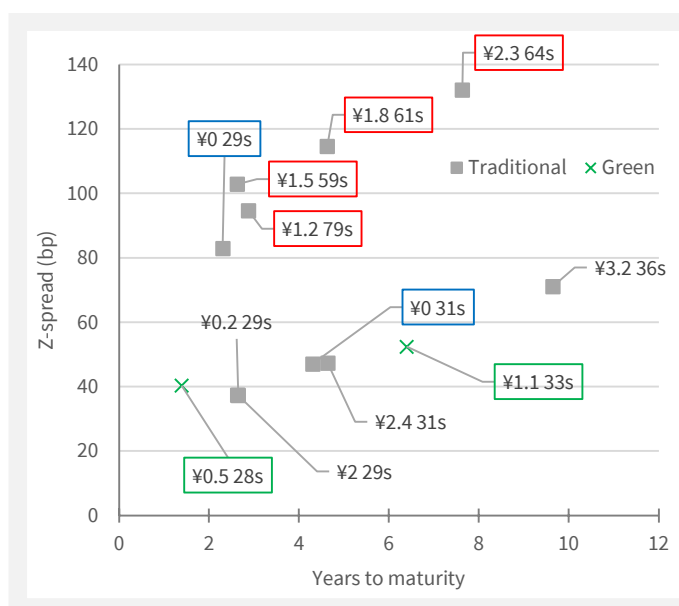
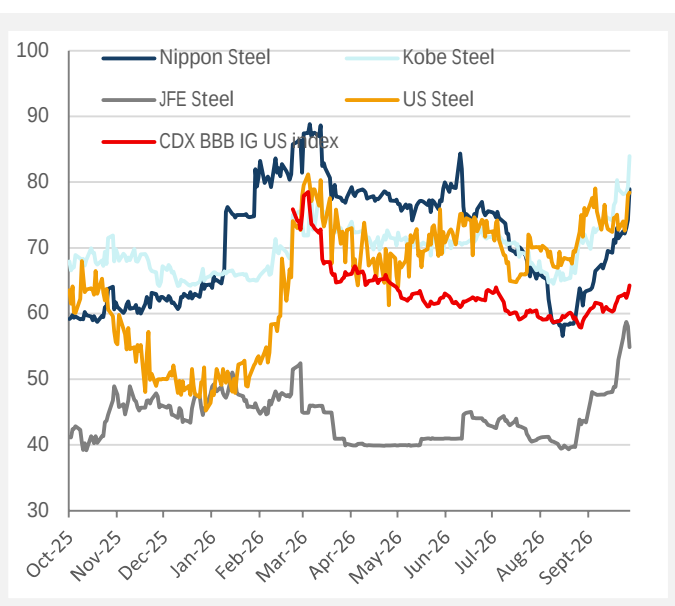


Figure 4. 5 yr CDS for Nippon Steel, Kobe Steel, JFE Steel, U.S. Steel, and CDX IG BBB US index. Source: Bloomberg Finance L.P. accessed 26 Oct 2026.



Overall, Nippon Steel JPY bonds seem to reflect low levels of concern over the issuer's credit and transition risk. It is interesting to note that the CDS trades relatively wide for the Japanese steel issuers, versus the local currency bonds. For U.S. Steel, although the CDS tracks close to Nippon steel CDS recently, the USD U.S. Steel

⁹ For details on the calls and step up in coupons if not called, please see Table 1 in Appendix.

¹⁰ For an analysis of Nippon Steel's green bonds please see "[Nippon Steel green bonds: A bare minimum strategy](#)", AFII, 9 Jan 2024.

cash bonds trade much wider, with the recently issued 2036 guaranteed bonds by Nippon Steel trading at around z-spd of 168bps, as of 26 Oct 2026. This contrasts with the NIPSTL 3.2% 2036 JPY bonds which trade at a JPY z-spd of 75bps, or an equivalent swapped spread of 108bps, if swapped to USD.

Nippon Steel contributed about USD100mn to the US operations on April 30, 2026.¹¹ In addition, U.S. Steel issued USD1.2bn of bonds in July 2026 to refinance 2029 maturities that were guaranteed by Nippon Steel. This guarantee led to a ratings uplift from Moody's/S&P of Ba2/BB+ to Baa2/BBB, respectively.¹² The 2036 bonds paid 122bps over the 10-yr US Treasury at issue, versus the existing BB+ rated 2037 bonds that were trading at around 180bps over. This indicates about 60bps of financing cost savings.

Steel making implications of the acquisition

The acquisition of U.S. Steel has increased the consolidated crude steel capacity of the company to about 86mn metric tons from 63mn metric tons.¹³ Nippon Steel's strategy is to move towards 100mn tons of global steel production. Given slowing demand in Japan and excess steel supply from China, Nippon Steel turned to the US market to pursue its plans for growth.

Nippon Steel currently has about a 40% market share in Japan and a domestic production of about 36mn metric tons.¹⁴ U.S. Steel brings a total of 11 blast furnace (BF) facilities across US and Europe and five electric arc furnaces (EAF) with a raw steel production of about 14.2mn metric tons per year.¹⁵ In addition, U.S. Steel holds two iron ore mines located in Minnesota.

U.S. Steel facilities can be sorted into three distinct groups:

- Integrated steel sites Gary and Mon Valley have been protected by the National Security Agreement that requires US government oversight for plant closures, employment reductions, and idling.¹⁶ Nippon Steel has also committed not to import steel slabs to compete with the site's BF at Braddock and Gary.
- Granite City and other facilities, which have similar protections only until 2027.
- Big River mini mills with EAF technology and downstream assets.

The first group is a more contractually 'constrained' asset.¹⁷

Nippon Steel Japan currently operates 10 BFs, 30 BOFs, and six EAFs in Japan. By FY29, Nippon Steel looks to add another three EAFs.

Market environment

United States: leading the way in EAF

The US steel industry has established a clear winner between BF/BOF and EAF technologies in recent cycles, with EAF production demonstrating a superior cost structure and profitability. While Section 232 tariffs

¹¹ ["United States Steel Corporation Condensed Consolidated Financial Statements"](#), United States Steel Corporation, 2026.

¹² ["U.S. Steel Corp.'s Proposed Bonds Rated 'BBB' On Guarantee From Parent"](#), 6 Jul 2026.

¹³ ["Beginning of a Partnership with U. S. Steel"](#), Nippon Steel, 18 Jun 2025.

¹⁴ ["Q1 FY2026 Appendix"](#), Nippon Steel, 4 Aug 2026.

¹⁵ ["Beginning of a Partnership with U. S. Steel"](#), Nippon Steel, 18 Jun 2025.

¹⁶ ["US Steel to end steel production at Illinois plant but no layoffs"](#), AP News, 10 Sept 2025.

¹⁷ ["United Steel Corporation Fifth Amended and Restated Certificate of Incorporation"](#), SEC, Jun 2025.

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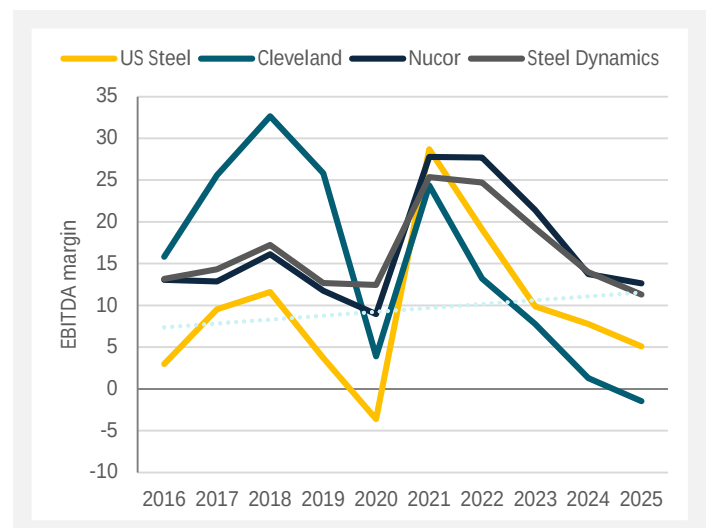
imposed by the Trump administration have protected some of the US integrated producers relying on BF/BOF technology in the short term, the structural cost advantages of EAF technology remain. Nucor and Steel Dynamics show that EAF-based flat rolled production generates higher margins over the cycle. The US produces currently about 70% of its steel via EAF technology given its abundant scrap resources.¹⁸

Over the cycle, U.S. Steel and Cleveland-Cliffs show higher volatility in return on invested capital (ROIC), operating margins, EBITDA margins, and higher leverage ratios than their EAF-focused peers Nucor and Steel Dynamics. While U.S. Steel's 10-year EBITDA margin from 2016-2025 was around 9.5%, Nucor and Steel Dynamics registered over 16% average EBITDA margins in the same period.

Debt/EBITDA was also significantly lower at Nucor and Steel Dynamics, averaging about 1.5x versus U.S. Steel's 3.8x over the same period. See Figure 14 and Figure 15 and Table 2 in the Appendix for detailed comparisons.

While product mix is different for the BF technology giants U.S. Steel and Cleveland-Cliffs compared to the EAF-focused Nucor and Steel Dynamics, the use of BF/BOF technology has been described as fundamentally necessary for high-tier, more specialised steel products. However, Nucor and Steel Dynamics are both expanding and have been consistently profitable and are competing in the auto and higher end steel segment. Steel Dynamics is directly competing with U.S. Steel Big River's flat-rolled sheets and higher value automotive products. U.S. Steel's legacy BF assets also have higher fixed costs and lower operating flexibility. In the US steel market, it is difficult to be competitive using BF technology over the cycle, as the profitability gap between BF and EAF producers is structural. Higher leverage also compounds this problem, with higher interest payments needing to be serviced when margins are collapsing in cyclical downturns.

Figure 5. EBITDA margins of U.S. Steel and competitors, FY end December 31. Source: Bloomberg Finance L.P., accessed 23 Oct 2026.



Japan: three companies dominate the market

Japan has a very different competitive dynamic than the US. Nippon Steel is Japan's dominant steelmaker, with a strong position in high-value flat products and specialty steels. Nippon Steel, JFE Steel, Kobe Steel (the three top BF/BOF steel makers) and a set of EAF-specialised and downstream producers are the key industry players.

The BF-focused steelmakers are integrated and efficient: designing around the business of importing iron ores, coking coal, and using BF/BOFs to make steel. They have specialised in clean and high-quality steel for automotive sheet and electrical steel. Furthermore, electricity costs in Japan are high and dependent on imported fuels like LNG — unlike China, India, and other steel-exporting countries which may enjoy raw

¹⁸ "EAF steel: Beyond the blast furnace", McKinsey Global Institute, 30 Jun 2026.

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material cost advantages. The availability of higher-grade scrap and renewable energy power are also constrained in Japan, which makes EAF technology more expensive. Domestic demand is expected to fall to about 49mn tonnes per year by 2025, down from 59mn tonnes in 2019, with Nippon Steel anticipating further declines. Domestic hot-rolled coil (HRC) spreads over raw material costs in FY2026 are already below the prior year's average. At the same time, Chinese steel exports have risen sharply, and the Asia HRC spread has collapsed over the past five years.¹⁹

In response, Nippon Steel is restructuring its domestic operations to cut costs and improve efficiency, including through technology to reduce fuel and raw material consumption. It has reduced domestic crude steel capacity by 20% to lower fixed costs and has cut its breakeven point by 40% by improving its product mix and pricing.²⁰ Given Japan's structurally high power and raw material costs, and the intensifying competition from low-cost Chinese steel, Nippon Steel is prioritising overseas expansion, both to access growth markets and to secure upstream raw materials through vertical integration.²¹

Nippon Steel's competitive advantage in high-grade steel has historically rested on BF/BOF technology. However, this advantage is narrowing. A large-scale EAF operator like Nucor has demonstrated that EAF-based production can serve automotive customers at scale. The use of DRI as feedstock, rather than scrap, allows it to achieve the metallurgical consistency required for high-grade applications.²² However, Japan-specific challenges remain, particularly feedstock availability for EAF and the economics of DRI at scale.

Capital expenditure allocation

Turning to capital expenditure allocation, the U.S. Steel segment represents about half or more of the annual capex spend of the consolidated company. In its 1Q2026 report, Nippon Steel highlighted the following capital deployment for the U.S. Steel business, as shown in Figure 6. As of October 2026, cumulative approved projects for the U.S.

Figure 6. Capital expenditures approved and planned for U.S. Steel segment for the US segment. Source: U.S. Steel accessed 23 Oct 2026. EAF technology highlighted in blue. Downstream finishing technology highlighted in grey.

US Steel Capex (USD mn)		Capacity	Capex/ Investment	Start date	Committed
Plant/Location	Project				
Gary	Relining #14 BF		350	Sept-26	Yes
Gary	Upgrade hot strip mill		230	Sept-26	Yes
Granite City	Restart 2 BF	1.4 Mt/yr		Mar-26	Yes
Big River	Ramp up 2 EAF	2.5Mt/yr		Jun-26	Yes
Big River	New DRI plant		1880	Q1 2029	Yes
Mon Valley	BF mill slag recycler		90	2028	
Mon Valley	Hot strip mill/ other	~3000		Late 2029	Yes
Fairfield	New premium thread line		70		Yes
Fairfield	Expansion of steel pipe quench/tempering line		475		Yes

Steel segment have reached about USD6.7bn of the slated USD 10.8bn.²³ The largest capex, at USD3bn, was approved for the Mon Valley integrated steel plant to construct a new hot strip mill, replace aging equipment, and increase annual production capacity from 2.2mn to about 3.5mn tons.²⁴

Of upfront investments over the next three years, about USD4bn is earmarked for Big River Steel/new mini mills, which uses the EAF/DRI technology, while the remaining 60% of investments will mostly go to

¹⁹ "FY2025 Financial Results", Nippon Steel, 13 May 2026.

²⁰ "Overview of Nippon Steel Business Performance and Future Initiatives", Nippon Steel, 23 Jun 2026.

²¹ "Overview of Nippon Steel Business Performance and Future Initiatives", Nippon Steel, 23 Jun 2026.

²² "Advanced EAF Steel Capabilities for Automotive Platforms", Nucor, 2026.

²³ "Q1 FY2026 Financial Results", Nippon Steel, 4 Aug 2026.

²⁴ "U. S. Steel Board Approves Nearly \$3 Billion Investment for New Hot Strip Mill at Mon Valley Works", 23 Oct 2026.

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downstream assets such as hot strip mills and steel pipe/tubular projects. A smaller amount is going into legacy BF/BOF technologies (See Figure 16 in the Appendix for details). However, even if capex is not spent on BF technology, downstream investments in Gary and Mon Valley and commitments not to import slabs at these sites does lock in BF production at these locations for the medium/longer term.

U.S. Steel's EBITDA (proxy for cashflows), less interest and capex, has been negative or negligible since FY22 due to high capital requirements. With estimated capex of USD2.7bn in FY26, USD2.6bn in FY27, and USD4.6bn in FY28, estimated internally generated cash flows are likely insufficient to cover investment needs (see Figure 7). According to S&P, U.S. Steel is forecasted to have between USD300-400mn of negative free operating cash flow in 2026, and an even larger deficit in 2027.²⁵

The shortfall will require funding from Nippon Steel's parent or the capital markets — adding further pressure to an already highly leveraged balance sheet. Please see Figure 18 in the Appendix for details.

The restarting of BF production at Granite City reveals the tensions between organised labour and US political interests on the one side, and climate transition decisions on the other. Over the course of September to December 2025, Nippon Steel has switched plans from winding down Granite City's steel processing mill to restarting its BFs.²⁶ Organised labour and political interests could conflict with capital allocation going forward and affect longer term technology transition and profitability. While strong demand and high steel prices in the US suggest restarting the BF could be profitable in the short term as utilisation rates improve, the credit risk to the investor is that during cyclical downturns, BF assets such as Granite City become loss making. Moreover, there is an opportunity cost as the capex required to restart the furnaces could be reallocated to other technologies and investments.

Nippon Steel's domestic capex program has been narrowly focused on improving its next generation hot strip mill in Nagoya, the aim being to enhance the competitiveness of its high-grade products for automobiles. The

larger part of its future capex is dedicated to EAF technology, with the biggest investment earmarked for the Yawata EAF plant. Nippon Steel has already planned to replace some of its BFs with large scale EAFs by FY29, with projects at Yawata (JPY630.2bn), Hirohata (JPY140 bn) and Shunan (JPY98.5bn), making for a total capacity of about 2.9mn tonnes/ year. The total investment is about JPY868.7bn. Importantly, this is

Figure 7. US Steel's historical and FY26 estimated EBITDA-Interest-Capex. Source: AFII, Nippon Steel, US Steel, Bloomberg Finance L.P. accessed 23 Oct 2026.

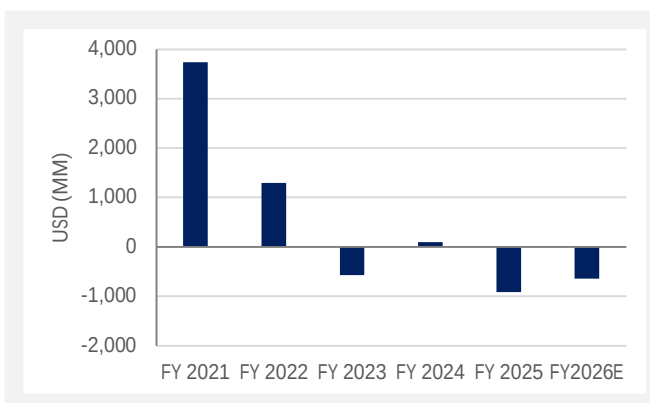


Figure 8. Capital expenditures planned and approved for Nippon Steel domestic plants. EAF technology highlighted in blue. Source: Nippon Steel accessed 23 Oct 2026.

Japan Capex (¥ Bn)	Project	Capacity	Capex/ Investment	Start date
Plant				
Yawata Area, Kyushu Works	Replace BF with EAF	~2 Mt/yr	630.2	2HFY29
Hirohata Area, Setouchi Works	Add EAF	0.5 Mt/Yr	140	2HFY29
Shunan Area, Yamaguchi Works	Modify/restart EAF	2.9Mt/Yr	98.5	2H FY28
Nagoya works	Hot-rolling line	6 Mt/Yr	270	Aug 26

²⁵ "U.S. Steel Corp. Upgraded To 'BB+' On Acquisition By Nippon Steel; Outlook Stable", S&P Global, 18 Jul 2025.

²⁶ "US Steel to resume steel production at Illinois plant shut 2 years ago", 6 Dec 2025.

subsidised by the government via its GX (Green Transition)²⁷ program for up to JPY251.4bn. The government is to provide opex support and a tax credit of JPY20,000 per ton of produced steel.

Carbon pathway – a credit variable

The current carbon intensity of Nippon Steel can be analysed using data from the two separate entities that existed prior to the US acquisition, plus the U.S. Steel entity's standalone metrics. In Figure 9, we can see that legacy Nippon Steel carbon intensity has been relatively stagnant at around 1.96Kt/ CO₂ as of FY2025 (March-end 25), while U.S. Steel's intensity has improved to 1.8 Kt/ CO₂ as of 2024 from 2.18Kt/ CO₂ in 2021. This is likely due to improvements from integrating EAF technology via the acquisition of Big River Steel after 2021.

As part of its Green Transformation (GX) initiatives,²⁸ Nippon Steel has a target to reduce total CO₂ emissions by 30% (a reduction of 31mn tons per year) by 2030 against a 2013 baseline. The company is taking a multi-technology approach to achieve this decarbonisation in Japan.

First, EAF will contribute to about 6.6% of total capacity by FY29 and help reduce emissions by 3.7mn tons per year. Second, the company is aiming to create a “GX Steel”²⁹ market across the entire value chain. Third, it is developing hydrogen-based steelmaking ‘COURSE50’ to be implemented by 2030 and commercialised by 2040.³⁰ Fourth, it is considering carbon capture and storage (CCS).

Figure 9. Historical carbon intensity of Nippon Steel consolidated and US Steel.
Source: Nippon Steel, US Steel

CO ₂ Emissions (K t-CO ₂)	FYE March 31				
	2021	2022	2023	2024	2025
Nippon Steel cons.	1.97	1.88	1.92	1.93	1.96
CO ₂ Emissions (K t-CO ₂)	Year-end Dec 31				
	2020	2021	2022	2023	2024
US Steel	2.18	1.84	1.88	1.81	1.80

Nippon Steel has built a pilot-scale EAF for hydrogen technology at its Hasaki R&D Centre and built an adjacent pilot-scale shaft furnace to test hydrogen based DRI production. It is developing hydrogen based DRI technology for commercial application eventually. Pilot operations started in March 2026, and the company has reported a 45% reduction in CO₂ emissions at a test blast furnace in the East Nippon Works Kimitsu Area. It has yet to disclose capex spent on this project or describe how further spending will be staged. Separately, the company identifies hydrogen injection via COURSE50/Super COURSE50 hydrogen DRI, large-scale EAFs, and CCS measures among its decarbonisation options. Previously, the company estimated commercial scale capital requirements of JPY4–5trn, but it has not publicly detailed its project-level committed capex for COURSE50/Super COURSE50 or CCS. Super COURSE50 is also funded through the government's Green Innovation Fund.

Carbon emissions are not a cost burden for steel producers in the US or Japan. However, GX-ETS became mandatory in April 2026 for large emitters above 100,000 tonnes of CO₂ annually, including Nippon Steel. GX-ETS (green transformation emissions trading system) is a carbon pricing and cap-and-trade program designed to help Japan reach net zero by 2050. The system requires the measurement, reporting, and

²⁷ See next section on details on GX Transformation.

²⁸ "Nippon Steel's Green Transformation (GX) Initiatives", 14 May 2026.

²⁹ GX Steel is the Japan's own definition of green steel, where its production has significant reduction in direct Scope 1 emissions by reduction actions by the steel maker. GX Steel may not satisfy European green steel requirements.

³⁰ "Nippon Steel's Green Transformation (GX) Initiatives", 14 May 2026.

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reduction of GHG emissions, with a current carbon price corridor of JPY1,700–JPY4,300 per tonne. Steel currently receives a 100% free allocation³¹, making the near-term cash cost negligible relative to ore, coal, scrap, and power costs. As this free allocation shrinks and carbon is priced, as it is under the EU ETS, emissions will become a direct margin cost. That cost is a function of carbon price and emissions intensity, making the BF/BOF versus EAF technology choice increasingly material over time.

As an illustration of how carbon costs could weigh on the company in the future, we highlight the following example. Using Nippon Steel's FY25 Japan Scope 1 emissions of 63 MtCO₂, and assuming *hypothetical* free allocation of 70% by FY2033³², net exposed emissions would be approximately 18.9MtCO₂ (as seen in Figure 10). At the stress price of JPY10,000, carbon cost approaches 18% of

Nippon Steel's pre-acquisition EBITDA. While the "stress price" in this case may be unlikely, it demonstrates what a higher carbon price could mean for the steel sector. EAF's lower emissions intensity becomes structurally advantageous as this cost rises, while BF/BOF assets face compounding maintenance and compliance costs. Please see Figure 17 in the Appendix for a more detailed sensitivity analysis for GX ETS carbon pricing.

Beyond GX-ETS, additional carbon exposure is possible via CBAM,³³ although Nippon Steel's European revenues were only approximately 6.5% of FY25 group revenues. Furthermore, customer requirements, like the need for automotive OEMs (original equipment manufacturers) to impose carbon intensity thresholds on steel inputs, will affect volume and pricing for high-emissions producers.

GX-ETS Phase II is unlikely to drive immediate structural changes across the Japanese steel market. The current price corridor is well below the level needed to incentivise large-scale technology deployment, and the system is not yet aligned with Japan's nationally determined contributions (NDC). However, as Japan's decarbonisation policy evolves, GX-ETS is likely to tighten, making carbon a progressively more material credit variable for Nippon Steel.

U.S. Steel carbon pathway

U.S. Steel is 100% owned by Nippon Steel, meaning its Scope 1,2, and 3 emissions are consolidated into the group. U.S. Steel has pledged a 20% reduction in GHG emissions intensity by 2030 versus a 2018 baseline and aims to become net zero by 2050. However, Nippon Steel has not yet fully integrated U.S. Steel into its group-wide decarbonisation strategy. The near-term focus is on improving efficiency at existing BF facilities rather than structural transformation. As discussed above, the capital investments in U.S. Steel seem to lock in BF production at the existing sites in the medium term.

These capital allocation decisions and the transition pathway are tightly linked and challenging for Nippon Steel. If the company continues to rely on BF/BOF technology, its financing costs may rise due to higher leverage, increased competition, and vulnerability in cyclical downturns. The best investment options will

Figure 10. Hypothetical GX-ETS price versus carbon cost for Nippon Steel. Source: AFII.

GX-ETS (¥/tCO ₂)	Annual carbon cost (¥ Bn)
1,700 (current floor)	32
4,300 (current ceiling)	81
10,000 (stress)	189

³¹ Phase 2 allocation is set against benchmarks of top tier efficiency (which includes Nippon and the other 2 BF steelmakers), which is essentially similar to Nippon Steel in terms of carbon intensity. This effectively is "free allocation."

³² FY33 is not a date that is planned for steel auctioning but this is used as for illustration purposes only.

³³ CBAM is the Carbon Border Adjustment Mechanism, which is a trade and climate policy implemented by the EU as a "carbon tax" on imports for high emissions goods (like steel) into the EU, where the importers must buy CBAM certificates.

differ by region, reflecting constraints in energy and power supply, scrap availability, and carbon tax regimes. The central question for Nippon Steel is whether it can find a credible EAF and DRI pathway that preserves its high-grade capabilities, alongside smaller scale BF/BOF operations. Failure to do so risks giving way to competitors who are already investing at scale in lower-carbon production routes.

Bondholder engagement

For bondholders, capital allocation between BF and EAF is not just an operational choice but a core credit decision. Debt used to extend BF facilities funds maintenance, not growth. Bondholders absorb the downside of higher leverage, weaker cash flow, and potential write-downs or stranded assets if BF technology becomes uncompetitive, yet do not share in the upside when steel prices are strong. Each dollar spent on BF relining also locks in high-emission, and structurally higher-cost, production for about 15 years, and directly crowds out EAF conversion and Japan decarbonisation capex. Bondholders therefore cannot be passive. Through refinancing and terms negotiated at issuance, they have direct influence over how, and on what conditions, capital is provided.

Thus, ahead of potential debt maturities in 2028-29, bondholders will have an opportunity to engage the company. Here are the priority issues:

- Potential funding gap: Given the possibility of negative free cash flow for the next two to three years, how will Nippon Steel fund any shortfall between operating cash flows and capex commitments? What buffers exist before leverage triggers a ratings concern?
- Capital allocation: Annual capex breakdown by project with approvals and concrete timelines. What are the decision criteria and timelines for BF relines versus retirement? At what debt levels would discretionary capex such as EAF projects be deferred? What payback periods are expected for EAF projects such as the Yawata facility?
- Emissions disclosure: Scope 1 and 2 intensity breakdowns by operations in the US, Japan, and Europe, separately, and on a consolidated basis.
- Transition technology: How are ageing Japanese BFs approaching relining decisions being assessed against conversion alternatives? What is the capital commitment for the Hasaki hydrogen program to FY2030, and what criteria determine whether it proceeds to commercial scale? How are BF maintenance, EAF expansion, and hydrogen DRI projects prioritised when operating cash flows fall short of forecasts?
- Financing alignment: Would Nippon Steel consider transition-linked debt structures with KPIs tied to measurable decarbonisation milestones, such as BF retirement schedules or EAF capacity as a percentage of total crude-steel capacity?

Conclusions

Nippon Steel increased debt and leverage on its balance sheet to acquire U.S. Steel in 2025. This acquisition came with large upfront capital commitments for the US business focused on BF technology. The decarbonisation pathway for Nippon Steel is at a critical juncture, as the company has limited financial

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flexibility. The company's decisions on capital allocation into BF and EAF technologies are important not only for decarbonisation but also for its future credit pathway. These have important implications for bondholders. With some potential maturities coming up in 2028/2029, bondholders are in a position to engage the company prior to refinancing and fresh capital raises for capex.

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Appendix

Table 1. List of bonds outstanding from Nippon Steel and U.S. Steel. Source: Bloomberg Finance L.P. accessed 23 Oct 2026

Nippon Steel (JPY Bn) Japan bonds

ISIN	Issue Date	Outstanding Amount	Coupon	Maturity	Series	Currency
JP338100CS64	16/06/2026	19.6	2.444	16/06/2031	14	JPY
JP338100BS65	16/06/2026	46.1	2.014	15/06/2029	13	JPY
JP338100AS66	16/06/2026	24.3	3.202	16/06/2036	15	JPY
JP338100AQ68	13/06/2024	67.5	1.534	13/06/2059 (1)	4	JPY
JP338100CQ66	13/06/2024	80	2.328	13/06/2064 (2)	6	JPY
JP338100BQ67	13/06/2024	20	1.882	13/06/2061 (3)	5	JPY
JP338100AP36	09/03/2023	30	0.564	17/03/2028	7	JPY
JP338100BP35	09/03/2023	20	1.15	18/03/2033	8	JPY
JP338100CL61	17/06/2020	10	0.42	20/06/2030	6	JPY
JP338100CK96	12/09/2019	200	1.24	12/09/2079 (4)	3	JPY
JP338100AK64	14/06/2019	20	0.279	20/06/2029	3	JPY
JP368100AK46	17/04/2019	10	0.39	17/04/2029	12	JPY
JP368100BJ63	14/06/2018	10	0.95	14/06/2038	11	JPY
JP338100CJ65	12/06/2018	20	0.385	20/06/2028	9	JPY
JP368100AJ31	05/03/2018	15	0.395	03/03/2028	9	JPY
JP338100BHC4	08/12/2017	10	0.35	20/12/2027	6	JPY
JP338100BH50	25/05/2017	10	0.375	20/05/2027	4	JPY
JP338100BG93	26/09/2016	10	0.64	19/09/2031	2	JPY
JP338100B898	02/09/2008	10	2.491	20/06/2028	59	JPY
Convertible Bonds						
XS3298822258	12/03/2026	300	0	14/02/2029		JPY
XS3298822506	12/03/2026	300	0	14/02/2031		JPY
Total		1232.5				

US Steel (US) (USD Mn)

ISIN	Issue Date	Outstanding Amount	Coupon	Maturity	Series	Rating	Currency
US912909AV01	14/07/2026	700	5.2	01/08/2031	144A	BBB	USD
US912909AW83	14/07/2026	500	5.7	01/08/2036	144A	BBB	USD
US912909AD03	21/05/2007	274.1	6.65	01/06/2037		BB	USD
Total		1,474.1					

(1) Subordinated, callable 6/2029 and every 6 mo thereafter, if not called coupon reset to 5yr JGB+1% annually; 2049: 5 yr JGB+1.25%; 2054: 5 yr JGB+2%

(2) Subordinated, callable 6/2034 and every 6 mo thereafter, if not called coupon reset to 1-yr JGB +1.62% annually; 2054: 1 yr JGB+2.37%

(3) Subordinated, callable 6/2031 and every 6 mo thereafter, if not called coupon reset to 1-yr JGB +1.2% annually; 2034: 1-yr JGB +1.34%; 2051: 1 yr JGB+2.2%.

(4) Subordinated, callable 6/2029 and every 6 mo thereafter, if not called coupon reset to 6mo JGB +1.55% annually; 2049: 6mo JGB+2.3%

*All subordinated bonds have deferrable interest.

US Steel Municipal bonds (USD Mn)

CUSIP	Issuer Name	Amount	Coupon	Dated Date	Maturity
04110FAC9	Arkansas Development Finance Authority	375.2	4	24/03/2026	01/09/2046
04110FAD7	Arkansas Development Finance Authority	375.2	4.25	24/03/2026	01/09/2046
04110FAA3	Arkansas Development Finance Authority	290	5.45	02/09/2022	01/09/2052
439241AA8	Hoover Industrial Development Board	275	5.75	25/10/2019	01/10/2049
04110FAB1	Arkansas Development Finance Authority	240	5.7	18/05/2023	01/05/2053
455054BE5	Indiana Finance Authority	88.81	4.125	12/03/2021	01/12/2026
45505RBV6	Indiana Finance Authority	88.81	4.9	22/10/2026	01/02/2039
439241AB6	Hoover Industrial Development Board	63.4	6.375	24/11/2020	01/11/2050
84552TAB8	Southwestern Illinois Development Authority	40	5.75	17/08/2012	01/08/2042
455054BD7	Indiana Finance Authority	33.3	6.75	24/11/2020	01/05/2039
01730PAB5	Allegheny County Industrial Development Authority	33.03	5.125	25/10/2019	01/05/2030
455054AT3	Indiana Finance Authority	29	5.75	17/08/2012	01/08/2042
017292XM0	Allegheny County Industrial Development Authority	24.995	5.75	17/08/2012	01/08/2042
Total		1,956.75			

*The municipal authority issues the bonds and US Steel signs a loan agreement to pay all principal and interest to bondholders. The municipal authority bears no financial liability.

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Figure 11. U.S. Steel production facilities. Source: Nippon Steel

US		Crude Steel Capacity (Mst/Y)	Blast Furnace (BF)	Basic oxygen Furnace (BOF)
Integrated Steel Mills				
Flat-rolled	Gary	7.5	4	6
	Mon Valley	2.9	2	2
Tubular	Fairfield	1.6		
Mini Mill	Big River	6.3		
Downstream bases				
Flat-rolled	Granite City	2.8	2	2
	Great Lakes			
	PRO-TEC			
	Double G			
Europe	Kosice	5	3	

Figure 12. Nippon Steel production facilities. Source: Nippon Steel accessed 20 Oct 2026.

Japan		Crude Steel Capacity (Mst/Y)	Blast Furnace (BF)	Basic oxygen Furnace (BOF)	Electric Arc Furnace (EAF)
North Nippon Works	Muroran	1.2	1	2	1
East Nippon Works	Kashima	6.4	1	2	
	Kimitsu	6.6	2	5	
Nagoya Works		5.5	2	6	
Kansai Works	Wakayama	2.4	1	3	1
	Osaka				1
Setouchi Works	Hirohata	0.6		3	1
Kyushu Works	Yawata	3.7	1	4	1

Figure 13. Convertible bond valuations. Source: AFII, Bloomberg Finance L.P. accessed 23 Oct 2026.

The delta of the convertible bond is used as a rough proxy for the probability that the option will end up in the money for the convertible bond holder to convert, even though these are not the same concept. Delta is a measure of price sensitivity, which is how much the bond's price changes when the underlying stock changes by \$1. All inputs, such as convertible bond price, spread, and historical volatility, are sourced from Bloomberg

Bond DF8187976		Stock 5401 JP Equity	
10 Pricing Analysis		10 Cash Tender	
20 Analysis		20 Credit Curve	
Market Price		Volatility	
107.062		654.000	
BLOOMBERG GENL		Flat 5 Year Spre...	
Trade Date		Settle Date	
10/25/2026		10/27/2026	
Model		E2C	
Jump Diffusion		0.0	
Fair Value		Greeks based on	
109.383		Mkt Price & Vol	
Cheapness (%)		Bond Floor	
2.122		97.839	
Implied Spread		Option Value	
187.327		11.544	
Implied Vol		Parity	
22.279		91.226	
Delta (%)		Premium (pts)	
53.623		15.836	
Delta (pts)		Premium (%)	
0.489		17.359	
Effective Trig		Gamma	
0%/0.000		1.108	
Unit Prc		Vega	
10.938MM		0.542	
Hedge Ratio		Theta	
0.075		-0.004	
Description		Exp Life (Fugi...	
Bond CUR		2.124	
JPY		Issue Amt	
Conv Prc		300.00MM	
Stock CUR		Next Call Date	
JPY		None	
Stock Ticker		Next Put Date	
5401 JP		None	
Cusip		Next Call Price	
DF8187976		None	
Collateral		Next Put Price	
SR UNSECURED		None	
Par Amount		Prov Trig	
100000000...		None	
ISIN		Prov Start	
XS3298822258		None	
Common		Prov Addl Points	
329882225		None	
Wertpapier		BEst EPS 1Y/2Y	
A4ERAC		None/None	
Moody's Rating		BEst P/E 1Y/2Y	
N.A.		None/NL	
S&P Rating		BEst PEG 1Y/2Y	
N.A.		None/NL	

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Finance L.P. We assume a stock borrow cost of 0.5%. The delta is 53.623%. The 2031 convertible shows a similar delta.

Table 2. EBITDA margins between U.S. Steel competitors. Source: Bloomberg Finance L.P. accessed 21 Oct 2026

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
US Steel	2.98	9.55	11.60	3.69	-3.60	28.71	19.13	9.88	7.77	5.08
Cleveland	15.83	25.61	32.68	25.83	3.90	24.35	13.21	7.77	1.31	-1.46
Nucor	13.06	12.88	16.13	11.77	8.98	27.81	27.69	21.40	13.75	12.63
Steel Dynamics	13.17	14.32	17.25	12.69	12.44	25.38	24.71	19.24	13.96	11.31

Figure 15. Return on invested capital between U.S. Steel and competitors. Source: Bloomberg Finance L.P. accessed 21 Oct 2026

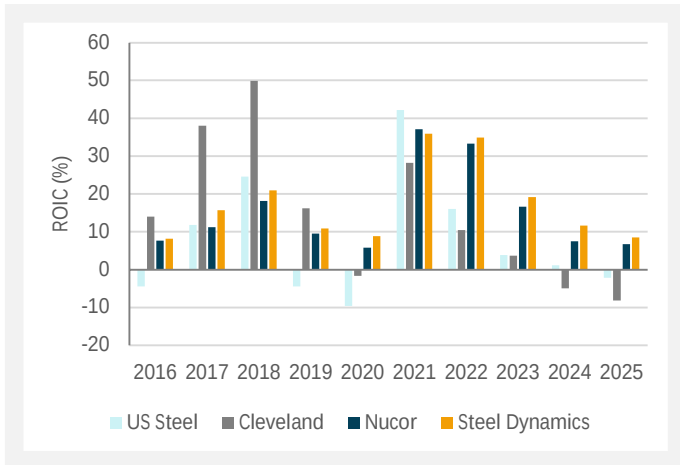


Figure 14. Debt/EBITDA metrics for U.S. Steel and competitors. Source: Bloomberg Finance L.P. accessed 21 Oct 2026

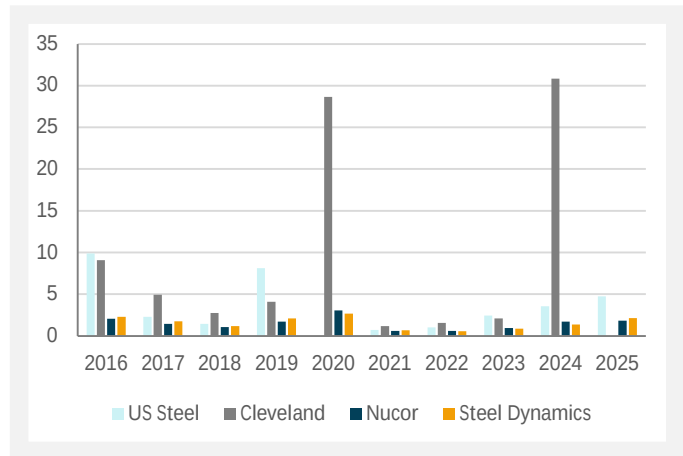


Figure 16. Capital investment at U.S. Steel. Source: Form 8-K for U.S. Steel, SEC, 18 Jun 2025

USD Bn	State	Facility	2025	2026	2027	2028	Total
	Arkansas	Big River Steel	\$0.10	\$0.90	\$0.90	\$1.30	\$3.00
	Indiana	Gary Works	\$0.40	\$0.90	\$0.80	\$1.10	\$3.10
	Pennsylvania	Mon Valley	\$0.10	\$0.70	\$0.70	\$0.90	\$2.40
	Minnesota	Keetac/Minntac	\$0.20	\$0.20	\$0.30	\$0.30	\$0.80
	Alabama	Fairfield Works	\$0.20	\$0.20	\$0.10	\$0.10	\$0.50
	TBD	New Mini Mill	-	-	-	\$1.00	\$1.00
	Total	--	\$0.90	\$2.70	\$2.60	\$4.60	\$10.80

Figure 17. Carbon cost sensitivity table with assumed allocation rates beyond 2026's free allocation for Nippon Steel.

Fiscal year	Scope 1 (MtCO ₂)	Free allocation rate	Free allowance (MT)	Net Mt
2026	63	100%	63	0
2028	62	90%	55.8	6.2
2030	59	80%	47.2	11.8
2033	59	70%	41.3	17.7
2035	59	55%	32.45	26.55
2040	59	40%	23.6	35.4

GX-ETS (JPY/tCO ₂)	GX-ETS USD	Exposure (JPY Bn) for		
		6 Mt	12 Mt	20 Mt
1,700	11	10	20	34
4,300	27	26	52	86
6,000	38	36	72	120
10,000	64	60	120	200
20,000	127	120	240	400

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Figure 18. Historical projected FY2026 EBITDA-Interest-capex for U.S. Steel Corporation. Source, AFII, Nippon Steel, U.S. Steel, Bloomberg Finance L.P. Accessed 23 Oct 2026

	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY2026E
EBITDA (adj)	5820	4030	1784	1215	838	2250
D&A	791	791	916	913	1079	1100
EBIT	4946	3160	799	240	-304	1150
Interest exp	313	159	72	24	190	190
Capex	1769	2576	2287	1097	1561	2700
EBITDA-Int-Capex	3738	1295	-575	94	-913	-640

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