

2025 SUSTAINABILITY REPORT UPDATES: JFE HOLDINGS

September 2025

INTRODUCTION

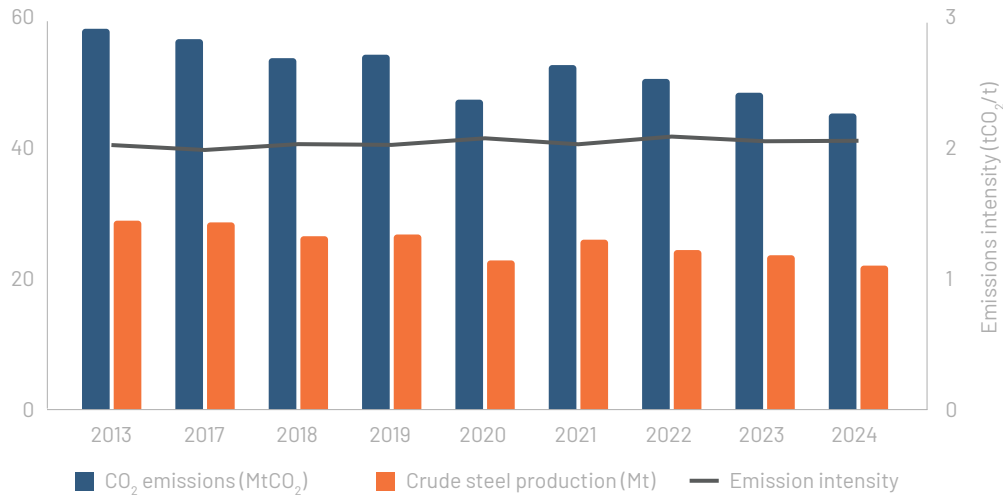
JFE Holdings has published its latest sustainability report. The company signals a modest shift towards a more proactive stance on decarbonisation, with announcements such as plans to transition from blast furnaces (BFs) to electric arc furnaces (EAFs). Emissions data suggest that the company achieved its 2024 reduction target and is gradually moving towards 2027 and 2030 targets. However, an examination of emissions intensity shows that the decline in total emissions is the result of production cuts rather than genuine reductions. In other words, JFE's most effective decarbonisation measure so far has not been the adoption of new technologies or improvements to production processes, but simply cutting output.

The company has also announced plans to install new EAFs, but without a clear strategy for procuring renewable electricity (RE), the full decarbonisation potential of these investments is unlikely to be realised. Our analysis suggests that, without a change in approach, achieving carbon neutrality by 2050 will be extremely difficult.

JFE HOLDINGS

In line with its 2030 and 2050 targets, JFE Holdings set a goal of reducing emissions to 47.6 MtCO₂ by 2024, representing an 18% cut compared with 2013 levels—and the company has achieved this. While steady progress has been made towards the targets, most of the reduction so far has come from cutting production, with emissions intensity largely unchanged since 2013. In fact, intensity has slightly increased from 2.03t CO₂/t in FY2013 to 2.06tCO₂/t in FY2024. Our analysis indicates that 100% of the observed emissions reduction is attributable to lower production, while the rise in intensity offset potential reductions by 6% should intensity have stayed the same as in FY2013. This suggests that over the past decade, JFE has lacked meaningful decarbonisation measures, relying almost entirely on output cuts to reduce emissions.

Figure 1. JFE Holdings Annual Steel Production and Emissions Trends



Source: Transition Asia, JFE Holding^{1 2 3 4}

Note: All figures are non-consolidated

JFE Steel has identified seven BF's for eventual replacement by carbon recycling, direct reduced iron (DRI) and EAF technologies. Its disclosed initiatives include:

1. **Carbon Recycling:** Designed for existing BF's, this technology captures CO₂, converts it into methane, and reinjects it into the furnace as a reducing agent. It has the potential to lower coke use and cut emissions by 30%, with CCS expected to deliver a further 20% reduction. A small pilot plant (1/25 the scale of a full furnace) began trial operations in May 2025, with demonstrations planned through FY2026. Medium-scale tests (around 700 m³) are scheduled for 2030, with commercialisation targeted for around 2040. As noted in the latest disclosures, the project remains at an early stage, and with no further updates provided, its current status is unclear.
2. **Direct Reduced Iron (DRI):** The company is developing hydrogen-based DRI (H₂-DRI) using lower-grade ore not typically suitable for direct reduction. In December 2024, trials began in a small test furnace (15 kg/h), achieving continuous DRI production with 100% hydrogen and low-grade pellets. However, the planned shaft furnace will rely on methane produced in a methanation plant, rather than the pure H₂-DRI route being pursued by Nippon Steel.

In parallel, a project launched in 2022 with Itochu Corporation and Emirates Steel (UAE) to import low-carbon HBI for high-grade steelmaking is scheduled to begin in the second half of FY2025. This material will be used in the new EAF at Kurashiki (due to start operations in Q1 FY2028) and in Chiba's No. 6 BF. Given Japan's high RE costs, importing green iron such as HBI is a rational strategy. JFE's decision to secure natural gas-based HBI could provide a pathway towards lower-carbon feedstock if the process is later switched to green hydrogen. However, with competitors set to operate commercial H₂-DRI plants and sourcing

¹ https://www.jfe-holdings.co.jp/common/pdf/sustainability/data/2025/sustainability_2025_j-A3.pdf

² <https://www.jfe-holdings.co.jp/uploads/2024-setumei250508-01e.pdf>

³ <https://www.jfe-holdings.co.jp/en/common/pdf/investor/library/group-report/2024/all.pdf>

⁴ <https://www.jfe-holdings.co.jp/en/common/pdf/investor/library/group-report/2022/all.pdf>

HBI from regions with cheaper green hydrogen, JFE will need to accelerate procurement of hydrogen-based HBI to remain competitive.^{5 6 7 8}

In addition to an investment of around JPY 60 billion already committed to the use of HBI in blast furnaces—supported by approximately JPY 1.6 billion in government subsidies—the company is also considering HBI injection at other BF sites, with the emissions reduction potential estimated at roughly 2 million tonnes of CO₂ per year.⁹ However, reliance on HBI in BFs risks entrenching dependence on blast furnaces, contrary to the global trend towards EAFs. It would therefore be preferable, even on a phased basis, to transition towards production routes that use HBI in EAFs—where emissions are far lower—rather than in BFs. With several BFs approaching the point of relining, this presents a timely opportunity not simply to extend their operation but instead to accelerate the transition to EAFs.

3. **EAF:** JFE has decided to replace the Kurashiki No. 2 BF with a state-of-the-art large EAF (annual crude steel capacity: ~2 Mt), scheduled to begin operation in Q1 FY2028. According to the company, this will reduce GHG emissions by 2.6 MtCO₂ annually—a positive step. The EAF will also use imported HBI from the UAE, enabling, for the first time globally, large-scale EAF production of advanced grades such as electrical steel and high-tensile steel. In October 2024, JFE secured government support under the GX Promotion Act, with up to JPY104.5 billion in subsidies approved for the EAF conversion, covering part of the total JPY329.4 billion investment.

JFE has also announced that expansion of the Sendai EAF is completed in the latter half of FY2024, which is expected to reduce CO₂ emissions by approximately 0.1 Mt per year. In addition, the company has decided to introduce an EAF into the stainless steel production process at Chiba in the second half of FY2025, which is expected to enable annual CO₂ emission reductions of up to around 0.45 Mt.

The share of each technology in JFE’s decarbonisation strategy remains undisclosed. However, EAFs are a proven, commercial technology, while H₂-DRI is emerging as the leading option for producing near-zero primary steel. Recent announcements to idle Kurashiki’s No. 3 BF (from May 2025 to FY2027/28) and to permanently close Fukuyama’s No. 4 BF in FY2027 suggest JFE is planning a more efficient downsizing of capacity.^{10 11} Taken together, this indicates that shifting from BF-based methods to proven alternatives offers the most realistic path to decarbonisation.

Our analysis shows that, if implemented as planned, JFE’s measures will deliver gradual emissions reductions. Around 2040s, several BFs will require refurbishment, temporarily lowering output and helping bring JFE closer to a 1.5°C pathway.¹² However, after 2045, production is projected to rebound to previous levels, making further reductions difficult. Even if all technologies are delivered on schedule, emissions in 2050 will be just 72% below 2013 levels—falling short of carbon neutrality.

5 <https://stegra.com/news-and-stories/h2-green-steel-has-pre-sold-over-15-million-tonnes-of-green-steel-to-customers>

6 <https://www.bbc.com.cn/EN/NewsEN/CNewsEN/3099.html>

7 <https://www.prnewswire.com/apac/news-releases/posco-holdings-takes-first-step-in-developing-40-000-tons-of-green-hydrogen-production-in-western-australia-301959009.html>

8 https://sustainability.posco.co.kr/S91/S91F10/eng/UI-PK_W009.do

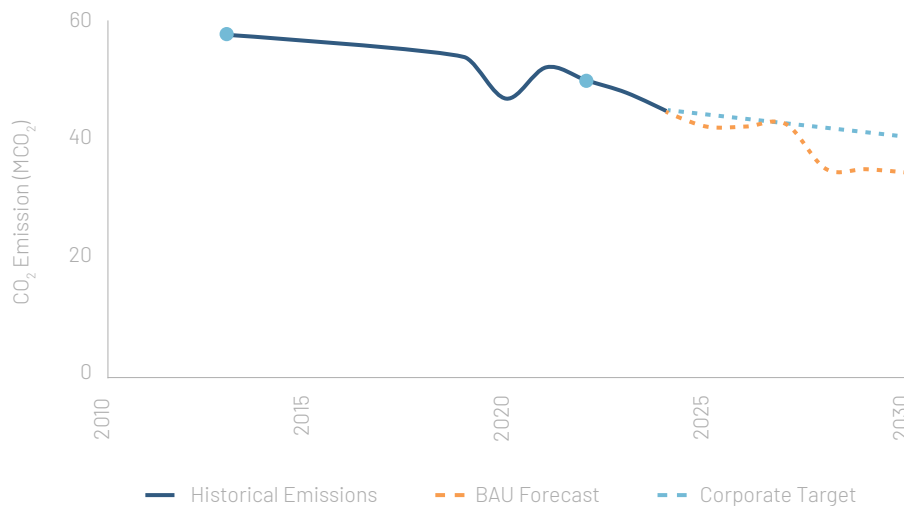
9 https://sii.or.jp/koujou05r/uploads/r5h_kj_koufuketteianken_2.pdf

10 <https://www.jfe-holdings.co.jp/common/pdf/investor/climate/environmental-management-strategy250529-01.pdf>

11 <https://www.jfe-steel.co.jp/release/2025/04/250402.html>

12 https://iea.blob.core.windows.net/assets/9a698da4-4002-4e53-8ef3-631d8971bf84/NetZeroRoadmap_AGlobalPathwaytoKeep-the1.5CGoalinReach-2023Update.pdf

Figure 2. Comparative CO₂ Emission Scenarios for JFE Holdings Steel Operations (Non-consolidated): JFE Holdings Corporate Targets and Transition Asia Model Projection to 2030



Source: Transition Asia, JFE Holdings^{1 2 3 4 5}

RENEWABLE ELECTRICITY PROCUREMENT

Our analysis shows that EAF-based steel emits 0.33 tCO₂ per tonne when using grid electricity, compared with just 0.05–0.1 tCO₂ when powered by 100% RE. Maximising the decarbonisation potential of EAFs therefore hinges on access to RE. So far, however, JFE has disclosed no clear procurement plans. Instead, it has emphasised in government councils or the interview the need for affordable and stable supplies of decarbonised power, hydrogen and ammonia, while continuing to place more weight on nuclear energy.^{13 14} Given its role in producing steel for offshore wind and expanding into O&M services, JFE could leverage these strengths to support its own decarbonisation.

CONCLUSION

For JFE Holdings to advance decarbonisation, it must go beyond reducing output and accelerate the shift from BF to EAFs, while placing stronger emphasis on importing low-carbon HBI. To maximise the potential of these efforts, the company also needs a more proactive strategy for RE procurement. This would not only deliver deeper emissions cuts but also enhance long-term corporate value.

¹³ https://www.enecho.meti.go.jp/committee/council/basic_policy_subcommittee/2024/056/056_009.pdf

¹⁴ <https://www.nikkei.com/article/DGXZ00UC090C00Z00C25A4000000/>

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