TransitionAsia
ACCELERATING EAST ASIAN CORPORATE CLIMATE ACTION

JFE HOLDINGS AGM INFORMATION PACK

June 2024

INTRODUCTION

Over the course of last year, JFE Holdings has made several significant announcements and progressions toward decarbonisation of its operations inline with their stated targets. Despite decreases in steel production while relying heavily on carbon recycling and utilisation from 2030, JFE is still expected to fall short of its targets toward and after 2040.

JFE EMISSION SUMMARY

JFE's carbon reduction plan mainly consists of COURSE50 and SuperCOURSE50, hydrogen (H_2) reduction ironmaking, carbon recycling (CCU), and carbon capture and storage (CCS). Among these efforts, COURSE50 is planned to be implemented first in 2030, followed by SuperCOURSE50. Finally, H_2 reduction in ironmaking will be implemented in 2050, moving the company toward zero-carbon production.[1] JFE also notes the application of electric arc furnaces (EAF) and carbon free electricity, but the planned capacity and timetable of a transition to EAF technology is unknown.[2]

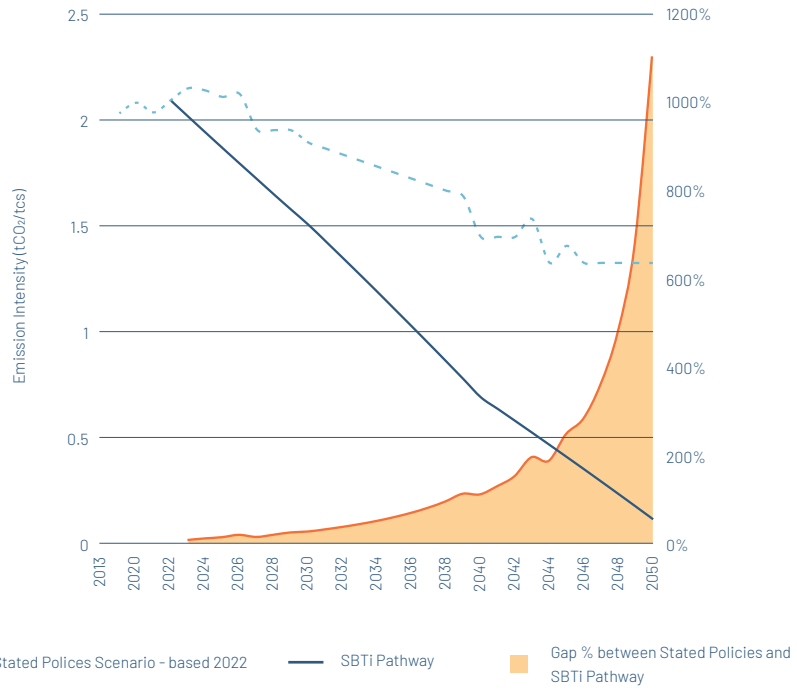
JFE's expected emissions are far above the IEA roadmap to 2050 by 22 million tonnes, with its emission level nearly 6 times the IEA 2050 net zero level. JFE must implement large-scale RE-powered EAF technology and green H_2-hot briquetted iron (HBI) instead of relying on blast furnace (BF) technology towards 2050 in order to become more consistent with the IEA's net zero pathway.

EMISSIONS PATHWAY ANALYSIS

Transition Asia's analysis of both carbon intensity per tonne of steel and absolute emissions suggest that JFE is far from reaching common benchmarks used to measure decarbonisation trajectories and progress; the SBTi Iron and Steel Sectoral Decarbonisation Approach (SDA), and the IEA net-zero pathway, as illustrated in Figure 1.

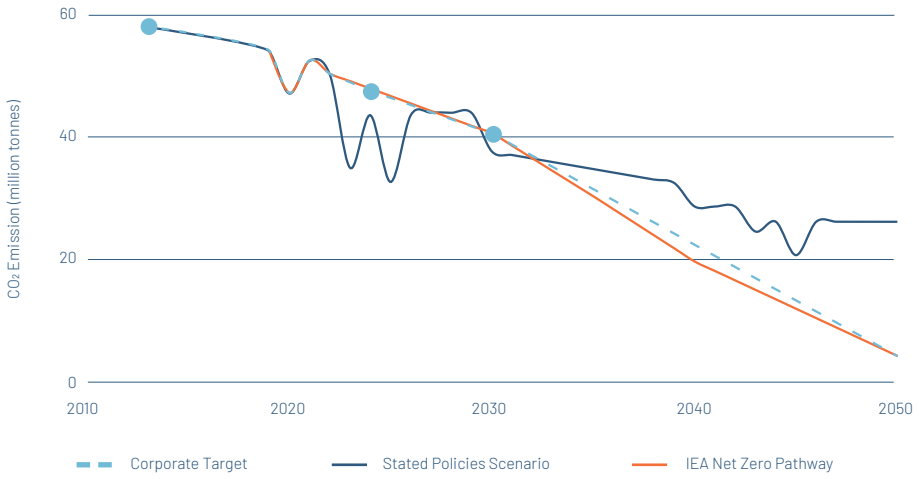
1 JFE Sustainability Report 2023, https://www.jfe-holdings.co.jp/en/sustainability/pdf/sustainability2023e_A3.pdf
2 "カーボンニュートラル戦略説明会." JFE Steel Carbon Neutral Strategy Briefing - Environmental Vision 2025, JFE , 1 Sept. 2022, www.jfe-steel.co.jp/company/pdf/carbon-neutral-strategy_220901_1.pdf.

Figure 1. JFE Carbon Intensity (tCO2/t) vs SBTi Benchmark



- Before 2030, due to planned BF relinings and the introduction of small-scale EAFs, JFE's carbon intensity showed a fluctuating downward trend. In JFE's "Stated Policies Scenario", the carbon intensity in 2030 decreased to approximately 1.9 tCO_2/tcs, a decrease of about 10% from 2022.
- After 2030, despite developments such as SuperCOURSE50 and transitioning some production capacity from BF-basic oxygen furnace (BOF) to EAF, JFE's carbon intensity is expected to decrease to around 1.3 tCO_2/tcs. However, the carbon intensity starts to remain relatively flat from 2043 due to the absence of stronger decarbonisation plans being announced which keeps the company far from needed decarbonisation by 2050.
- The rapid increase in the "Gap%" curve indicates that if JFE's decarbonisation efforts remain confined to those currently disclosed, the gap between its carbon emissions pathway and the SBTi target will grow exponentially towards 2050 due to the poor abatement potential of SuperCOURSE50 technology.

Figure 2. JFE Absolute Emissions vs IEA Net Zero Pathway



- JFE's steel business aims to cut total CO_2 emissions by 18% by the end of 2024, and by 30% by 2030 compared to 2013 levels. It also targets being carbon neutral by 2050.[3]
- Our stated policy scenario projects slowly decreasing emissions before 2030, which is achieved by the withdrawal of some BF-BOF capacity and the addition of EAF facilities. Later, with the implementation of COURSE50 technology and addition of new EAFs, JFE's carbon emissions begin to decrease in 2030.
- Although CCU technology, with an abatement potential of up to 50% compared to BF-BOF, is touted as a technology proposition by JFE, beyond a test site in 2030, there is no evidence on the commercial success of the technology.
- JFE's expected emissions begin to diverge from its target and the IEA pathway after 2030 due to a reliance on the aforementioned technologies that provide inadequate abatement.
- Between 2040 and 2050, the uncertainty in the development schedule and coverage capacity of large-scale EAF and H_2-DRI leads to slower carbon reductions.
- By 2050, JFEs annual CO_2 emissions are projected to be 26.4 million tonnes, far exceeding the IEA net-zero pathway by 22 million tonnes (by 6 times).

3 JFE Group Integrated Report 2023, https://www.jfe-holdings.co.jp/en/investor/library/group-report/2023/pdf/all_A4.pdf

DECARBONISATION DEVELOPMENTS IN THE LAST YEAR

Announced the collaboration with JSW in India for grain-oriented electrical steel production.

This partnership is set to commence full operation in 2027, with some uncertainty regarding the nature of the newly installed facilities.[4]

Announced a strategic agreement for the transportation of HBI

The initiative with Emirates Steel Arkan and Abu Dhabi Ports Group has sought an improved commitment to building DRI supply chains in DRI cost efficient countries.[5]

Announced a CCS feasibility study

JFE inked an MoU with KEPCO (Kansai Electric Power Company), a larger Japanese utility firm, for a feasibility study on CCS.

Announced a feasibility study for the development and utilisation of hydrogen

This feasibility study regards 'CO_2-free hydrogen' with ENEOS, a Japanese leading oil refiner. The two companies will conduct studies on the development and utilisation of a facility to receive, store, and supply CO_2-free hydrogen in this area.

Announced membership of a consortioum commencing the feasibility study about e-fuel that synthesising green hydrogen with CO_2 and its transportation in and from Australia

The agreement to jointly conduct a wide-ranging feasibility study covering CO_2 capture in Japan, shipping the CO_2 to Australia, production and storage of synthetic fuel (e-fuel) derived from the CO_2 in Australia, and the establishment of a comprehensive supply chain, including export of e-fuel from Australia.

An announced bond issuance for low-carbon steel projects

The bond, mobilising around 200 billion JPY (~ US$ 1.3bn), will allocate funds to various projects, including an EAF upgrade in Kurashiki, a new EAF installation in Chiba, and investments in its Indian joint venture.

4 "About the Joint Venture Agreement to Establish a Joint Venture Company in India to Manufacture Grain-Oriented Electrical Steel with JSW Steel Limited." 3 Aug. 2023, https://www.jfe-steel.co.jp/en/release/2023/230803-2.html.
5 "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, https://www.jfe-steel.co.jp/en/release/2023/230718.html.

APPENDIX

What is this pathway analysis

- Stated Policy Scenario (SP) which is Transition Asia's judgement on asset level decarbonisation levers used by JFE. These judgements are based on public disclosures made by JFE. The SP scenario can be compared to various benchmarks, such as the sector specific IEA net-zero scenario.
- Both in terms of absolute CO2 emission in million tonnes and emission intensity in tonnes of CO_2 per ton of crude steel production.

How corporate stated policies are integrated in the model, and how we set the scenarios

According to the policies disclosed by the company, major decarbonisation solutions include COURSE50, SuperCOURSE50 and large-scale EAF implementation. With regard to EAF implementation, there are some plant-based projects that have already been integrated into the pathway analysis model as key assumptions. However, information with regard to COURSE50 and SuperCOURSE50 implementation plans is limited to their starting year (COURSE50 starts from 2030, and SuperCOURSE50 starts from 2040). Therefore, two scenarios that assume different implementation schedules are introduced in this model.

- **Stated Policies Scenario**: considers each independent steel plant and integrates their individual relining schedule. All the blast furnaces that are scheduled to be relined during 2030~2040 are assumed to have COURSE50 from their relining year. Then, from 2040, SuperCOURSE50 will benefit all the blast furnaces that have already been influenced by COURSE50, together with the blast furnaces that are scheduled to be relined after 2040. Since plants' relining years are not concentrated during 2030–2040, this scenario will not cause SuperCOURSE50 to face huge pressure in the starting year of 2040.

Benchmarks

The IEA Net-Zero pathway: it reflects the net-zero roadmap of CO_2 emissions in the iron and steel sector provided by IEA.[6]

The SBTi Intensity Target: reflects the sectoral decarbonisation approach target using the SBTi's Iron and Steel target setting tool.[7]

6 IEA (International Energy Agency) (2023). Net Zero Roadmap: A Global Pathway to Keep 1.5oC Goal in Reach. https://iea.blob.core.windows.net/assets/9a698da4-4002-4e53-8ef3-631d8971bf84/NetZeroRoadmap_AGlobalPathwaytoKeepthe1.5CGoalin-Reach-2023Update.pdf

7 SBTi Steel Target Setting Tool. ttps://sciencebasedtargets.org/resources/files/SBTi-Steel-Target-Setting-Tool.xlsx

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