

EAF TECHNOLOGY AND 1.5°C-ALIGNED TARGETS ARE KEY TO NIPPON STEEL'S NET-ZERO ROADMAP

Transition Asia's recommendations for Nippon Steel and its stakeholders ahead of its 2023 AGM

15 May 2023

KEY RECOMMENDATIONS FOR NIPPON STEEL

- Commit to only 2 blast furnace-basic oxygen furnace (BF-BOF) relinings to take place before 2025, after which no relinings may be allowed. Capacity from retired BF-BOF should be replaced by electric arc furnace (EAF) technology;
- Disclose existing EAF strategy for analysis;
- Consider abandoning COURSE50, as it is a high-cost, low-impact investment, and use that CAPEX for long-term solutions like EAF development; and
- Adopt a carbon intensity target as well as absolute emission reduction target to ensure that Nippon Steel is well-equipped to maintain steel production levels and produce low-carbon steel for the future.

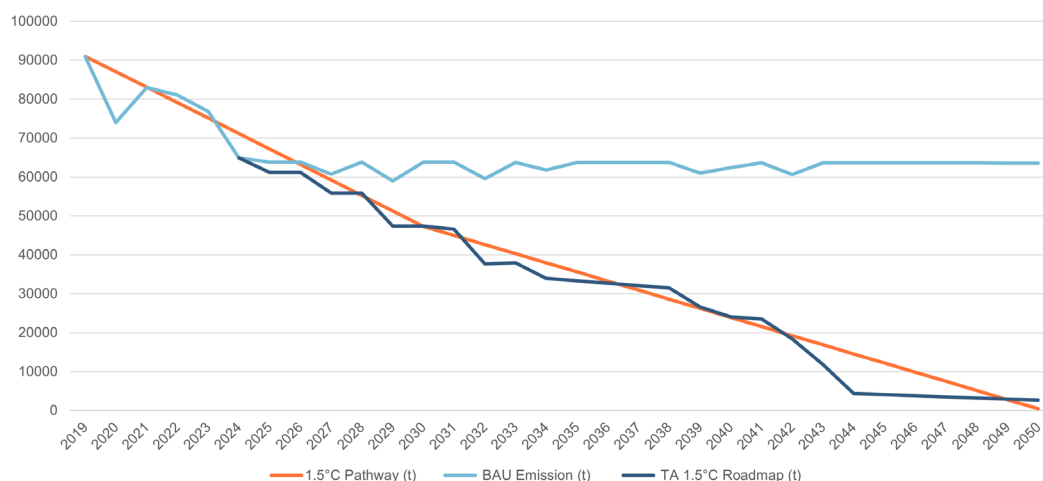
RELINING AND TECHNOLOGY SOLUTIONS FOR 1.5°C

We assume that BFs are expected to be relined based on a 20-year schedule. Of Nippon Steel's domestic Japan fleet, this means 5 are likely to be relined in the next 5 years. This is an alarming prospect that will keep emissions high well into the 2040s.

If Nippon Steel commits to only carrying out 2 more relinings of BF-BOFs by 2025, all BF-BOF technology will cease production by 2044. For BF-BOFs that are not relined, EAFs are the only currently available production method that can provide adequate emission reduction to reach the 1.5°C pathway (48% reduction from 2019 levels by 2030), so we assume EAFs will be built or acquired to replace the capacity. This "TA 1.5°C Roadmap" scenario is modelled below:

Nippon Steel should prioritise EAF technology as long-term solution

Figure 1 - 1.5°C Steel Production Pathway by 2050



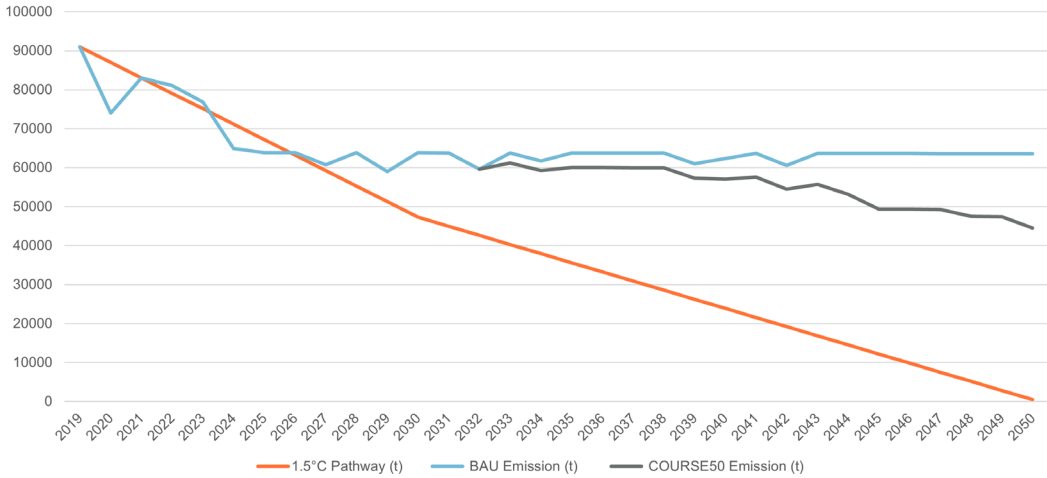
We acknowledge the high CAPEX requirements for this scenario, as this means that by 2030, 3 large-scale (300t) EAFs will need to be in operation and producing approximately 8.7 million tCS/pa (existing EAF capacity is 1.228). However, Nippon Steel should evaluate opportunities to acquire EAF assets that could provide CAPEX savings and increase the share of low-carbon steel production rapidly while maintaining steel production levels post-2025.

COURSE50 FAILS TO OFFER SUFFICIENT EMISSIONS REDUCTION POTENTIAL

COURSE50 could only achieve a 12% emissions reduction by 2050

When modelling out the effect of implementing COURSE50 technology to Nippon Steel's current fleet, which assumes it is integrated at every relining event after 2030, the expected emissions reductions are negligible - with cumulative emissions reductions only amounting to 12% (due to staggered rollout of COURSE50 technology). This project has been running since 2008 and is only expected to reach commercial operation in 2030.

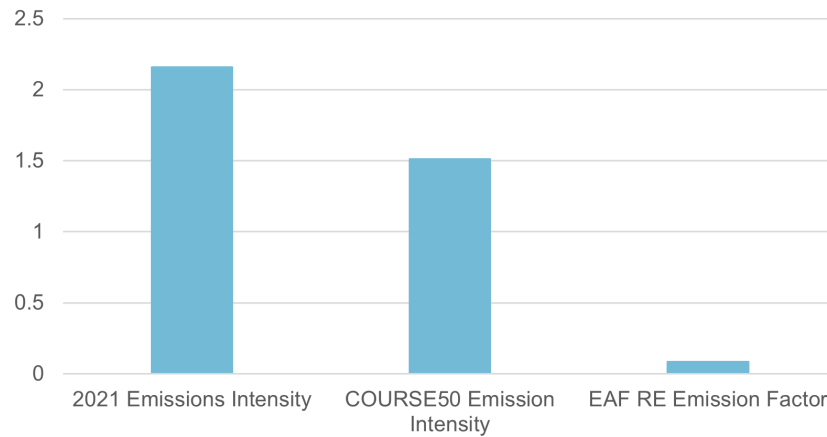
Figure 2 - Nippon Steel's COURSE50 Production Pathway



After implementation, COURSE50 technology only provides incremental improvements in the Japanese fleet and offers only a 12% reduction in emissions (from 2030) by 2050 compared to our BAU scenario.

With COURSE50 technology set to only begin practical implementation in 2030 and hypothesised to provide only a 30% reduction (CCS-20%, hydrogen-10%) in emission intensity per ton of crude steel, the project is neither aligned with a 1.5°C pathway unless coupled with rapid and far-reaching reductions in crude output, nor compatible with a 2050 net-zero pathway. Additionally, with CCS technology, the concern over corporate inaction and greenwashing remains.

Figure 3 - Emissions Intensity for Different Steel Production Methods (tCO2/t)



On the other hand, EAF and hybrid EAF technology is fully mature and can easily facilitate the use of hot briquetted iron (HBI) or direct reduced iron (DRI) from a plant in the future. The emissions intensity of adding COURSE50 while hoping other future technology advancement is adequate is not a realistic plan when EAFs already exist as an available and proven solution.

HOLLOW TARGETS MASK CLIMATE INACTION

Setting carbon intensity target is required to drive net-zero pathway

Our analysis shows that Nippon Steel's 2030 target is expected to have a higher carbon intensity (CI) than that of 2013 for its domestic fleet. This is following the anticipated cut in production capacity by 20%¹ under its new 5-year plan, then assuming flat production to 2030. In 2013, the CI was 2.26, and when calculated for 2030, it is expected to be 2.34 - an unimpressive CI even for 2023. Even at the global group level, Nippon Steel's CI is forecasted to be higher in 2030 than 2013 (2.11 versus 1.95 in 2013).

Setting an emissions reduction target that does not reduce CI is a form of greenwashing, as the decline in emissions will be based primarily on reduced steel production.

¹ <https://asia.nikkei.com/Business/Markets/Commodities/Nippon-Steel-cuts-capacity-20-for-zero-carbon-future>

APPENDIX: CALCULATION AND PATHWAY METHODOLOGY

“1.5°C pathway” reflects a 48% CO₂ reduction from 2019 levels by 2030 and a 99% reduction of CO₂ from 2019 to 2050 (net-zero), as stated in IPCC AR6 Synthesis Report.

“BAU Emission” pathway incorporates stated crude steel production decreases until 2025 where we have flatlined CS production until 2050. Production of CS reflects the production at assets in 2021. Share of RE supplying Nippon Steel’s EAFs steadily increases from 2030 and there are no changes in BF-BOF emission factors.

“Transition Asia’s (TA) 1.5°C roadmap” reflects the replacement of BFs with EAFs. Only two relinings may take place from now until 2024 based on a 20-year campaign of BF assets. After which, all BF assets must be mothballed at the end of their 20-year campaign.

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ABOUT TRANSITION ASIA

Founded in 2021, Transition Asia is a Hong Kong-based non-profit think tank that focuses on driving 1.5°C-aligned corporate climate action in East Asia through in-depth sectoral and policy analysis, investor insights, and strategic engagement. Transition Asia works with corporate, finance, and policy stakeholders across the globe to achieve transformative change for a net-zero, resilient future. Visit transitionasia.org or follow us @transitionasia to learn more.