TransitionAsia
ACCELERATING EAST ASIAN CORPORATE CLIMATE ACTION

SCRAP SUPPLY SHOULD NOT HINDER JAPAN'S STEEL TRANSITION

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SCRAP STEEL SUPPLY IN JAPAN

The quickest strategy for accelerating the decarbonisation of the Japanese steel industry in the near term is to transition to electric arc furnaces (EAFs) production using scrap. A frequently cited challenge in this shift is whether there will be a sufficient scrap supply. While Transition Asia acknowledges the need for further efforts to improve scrap recycling, scrap availability in Japan may not be as significant a barrier to the transition to EAFs as is often suggested.

In Japan, the average recovery rate of obsolete scrap is around 1.7%.[1] Japan, with the highest steel stock per capita and a net scrap steel exporter, does not have a near term scrap shortage problem. This is exemplified by cheaper than global average scrap prices.

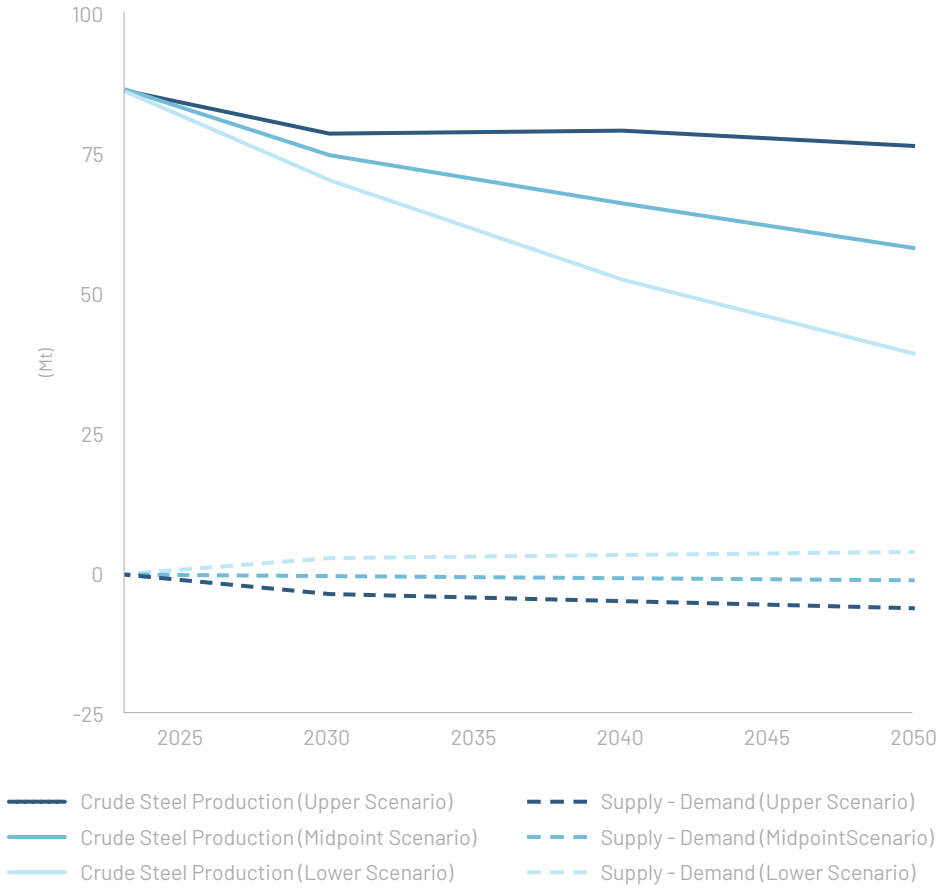
Crude steel production in Japan is set to decline in the future. Consequently, the amount of scrap generated—particularly home scrap and prompt scrap, which are closely linked to crude steel production—will also decrease, the supply-demand balance of scrap fluctuating in line with changes in crude steel production.[2]

SCRAP STEEL RECOVERY RATES NEED ONLY MINOR ADJUSTMENTS TO MEET DEMAND

As illustrated in Figure 1, Japan's scrap supply in 2050 is influenced by crude steel production levels and the recovery rate of obsolete scrap. Assuming that the recovery rate continues to decline at current rates, if crude steel production remains relatively high, a scrap shortage of approximately 6.3 Mt could occur. Conversely, if crude steel output falls to 40 Mt, there may be a surplus of 3.9 Mt. With production at 58 Mt in the midpoint scenario, the shortfall is projected to be around 1.3 Mt. However, if the recovery rate is maintained at or above 1.3% in FY2050—compared to 1.7% in FY2022—a supply shortage is unlikely.

1 The recovery rate of obsolete scrap refers to the proportion of obsolete scrap recovered from the cumulative steel stock, which is the total amount of steel used in Japan that remains within the country in some form, expressed in terms of iron and steel. https://www.jisri.or.jp/english/recycle/technology.html
2 https://transitionasia.org/scrap-steel-explainer/

Figure 1: Ranges of predicted Scrap Generation and Supply-Demand Balance



Source: TA analysis [3] [4]

In other words, as BF-BOF production is more closely correlated with total crude steel production than EAF, a decline in crude steel production would lead to a reduction in scrap demand, particularly in BF-BOF, thereby lowering the risk of a scrap shortage. On the other hand, if production remains high, scrap demand would also stay strong, heightening the risk of a shortage. Moreover, slowing the decline in the recovery rate would help curb the decrease in obsolete scrap generation, making it possible to prevent or significantly mitigate the impact of a scrap shortage.

3 In our analysis, regarding the supply of scrap, the predictions are based on the assumption that the recovery rate of obsolete scrap will continue to decline at the current pace. The amount of scrap export is not taken into account, not because they are insignificant, but because future export volumes can fluctuate significantly depending on policies and overseas demand, making them difficult to predict.

4 Based on the FY2019 crude steel production volume (98.4 Mt), a forecast by the Nippon Steel Research Institute projected that by 2050, crude steel production would range between 41.9 and 90.5 Mt, with a shortage of 4 to 11 Mt of scrap. However, crude steel production had already declined to 86.8 Mt by FY2023.
https://www.meti.go.jp/meti_lib/report/2021FY/000080.pdf

Table 1: Required Recovery Rate to Avoid Scrap Shortages

Scenario	2022	2023	2024	2025
Upper	1.68%	1.81%	1.73%	1.60%
Midpoint	1.68%	1.59%	1.44%	1.29%
Lower	1.68%	1.38%	1.15%	0.99%

Source : TA analysis [5] [6]

Currently, the Japan Iron and Steel Federation (JISF) has set a target of increasing domestic scrap circulation by around 6.9 Mt by 2030 in response to anticipated rapid growth in demand for scrap.[7] This will be achieved through the introduction of new incentive schemes and the development of infrastructure to generate high-quality scrap. Even in the Upper Scenario, which is expected to result in the largest scrap shortage, this target would be sufficient to cover the shortage of 6.3 Mt of scrap in 2050, leaving room for an increase in scrap-EAF steel production. Moreover, this analysis does not factor in the likely increase in direct reduced iron in EAF steel production, which could further reduce actual scrap demand. Internationalised steel companies seeking to import hot briquetted iron (HBI) from overseas - such as Kobe Steel from the Mitsui-Kobe Duqm DRI plant in Oman and JFE Steel from their DRI plant in UAE, would help to compensate for shortages of higher-quality scrap, particularly home scrap and prompt scrap, which are expected to decline significantly in the future.[8] [9]

RENEWABLE POWER IS THE KEY TO DECARBONISING JAPAN'S EAFS

With domestic scrap supply in Japan likely to remain relatively liquid in the near future and scrap recovery rates needing only minor adjustments, the key obstacle for decarbonising Japan's EAF fleet remains their access to cost competitive and predictable zero-carbon, renewable electricity. [10] [11]

5 If the recovery rate continues to decline at the current pace, it is estimated to be 1.56% in 2030, 1.38% in 2040, and 1.22% in 2050.
6 Our analysis was based on three scenarios: The Upper Scenario assumes that the share of crude steel production attributed to BF-BOF steel companies remains unchanged and that there will be no further changes to their production facilities (i.e. conversions to EAF or closures of BF-BOF facilities) beyond those already announced. The Lower Scenario assumes that the year-on-year decline rate of crude steel production observed over the past decade, excluding the pandemic period, will continue. The Midpoint Scenario represents the average trajectory of the Upper and Lower Scenarios.
7 https://www.cps.go.jp/goalsetting/a0EGA00000bULZn2AO/gs00000225
8 https://www.kobelco.co.jp/english/releases/1211747_15581.html
9 https://www.itochu.co.jp/en/news/press/2022/220901.html
10 https://transitionasia.org/japan-7-strategic-energy-plan/
11 https://transitionasia.org/japanese-eaf-steel/

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OUR TEAM

Head of Impact
Lauren Huleatt lauren@transitionasia.org
Japan Analyst
Kenta Kubokawa kenta@transitionasia.org
ESG Junior Research Fellow
Akira Kanno akira@transitionasia.org

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