Net Zero Steel

Japan Country Profile - Netzero Steel Project

www.netzerosteel.org/countries-results/

The Netzero Steel Project considers the geo-spatial evolution of production of 27 existing facilities in Japan described in the GEM database that account for 90% of Japan's 2019 production, as well as 8 smaller additional archetype plants that were added to account for missing production. All scenarios achieve >90% reduction in emissions by 2050, see the full report for the methodology and background to the study.

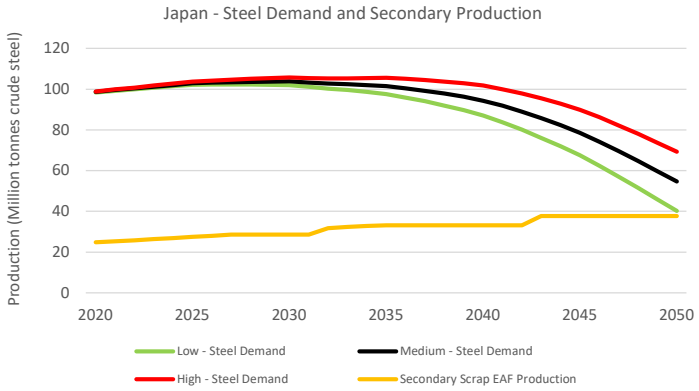
All the nine modelled scenarios (3 demand scenarios) and (3 CCS pipeline length scenarios) reduce overall emission intensities from an estimated existing emission intensity of 1.46 tCO2e/tonne of steel in 2019 to 0.16 tCO2e/tonne of steel in 2050. This compares to a global average of 1.58 in 2019 and 0.14 tCO2e/tonne of steel in 2050. Note that the study boundary includes all direct energy and process emissions that occur at integrated iron and steel mills, but does not include GHG Protocol Scope 2 or Scope 3 class emissions that occur off-site, or allow for the crediting of exported energy products (See report for more details).

Demand Transition

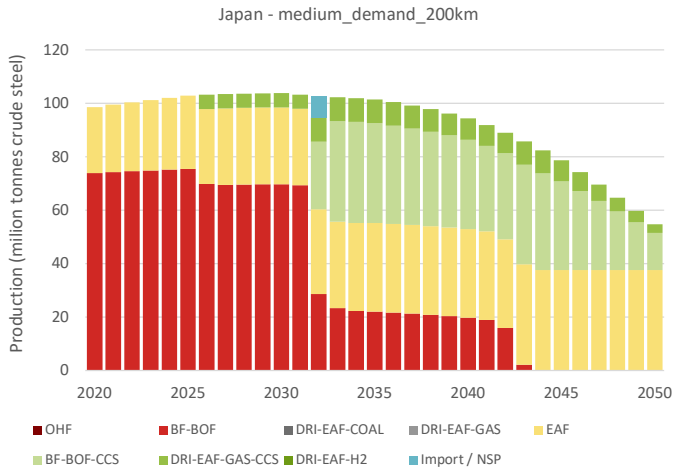
• In the medium demand scenarios Japan's steel demand decreases 45% between 2020 and 2050.

• low/medium/high scenarios in 2050 correspond to 387/526/665 tonnes crude steel per capita. This compares to a global average of 206/236/267 tonnes crude steel per capita.

• Secondary production from scrap in EAF rises from 24% in 2020 to 69% in 2050 in our central scenario. This compares to the projected global average of 46%.



Technology Transition



• By 2032 more than half of Japan's production is projected to be low carbon in the central scenario.

• DRI-EAF-H2 does not gain market share in the central scenario (range of scenarios is 0% to 6%).

• Steel production with CCS retrofit accounts for 31% of production in the 2050 central scenario (range of scenarios is 18% to 42%).

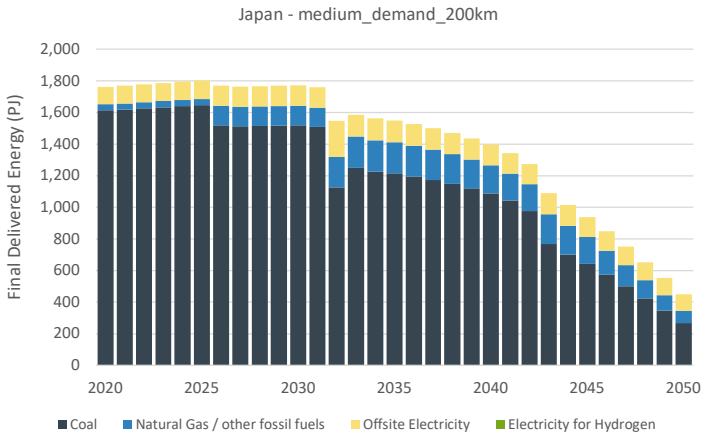
• The modelled pathways do not show significant imports of green steel for Japan. Global demand for imports in other countries and regions suggests that Japan could compete for exports to supply 175 megatonnes of demand by 2050 for green steel that is non-spatially allocated in the model.

Energy Transition

• Facility energy demand for fossil fuels falls by 79% by 2050 in the central scenario (range of scenarios is 66% to 91%).

• Electricity demand rises to 29 TWh in 2050, a rise from current levels of 0.9x by 2050 in the central scenario (range of scenarios is 0.8x to 1.5x). For comparison, electricity demand in 2050 represents 3% of current total electricity demand in Japan.

• In the central scenario there is no electricity demand for hydrogen production but the range across all scenarios is 0 to 11 TWh.



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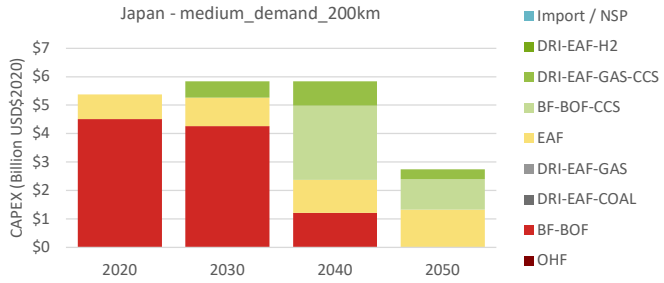
Investment Transition



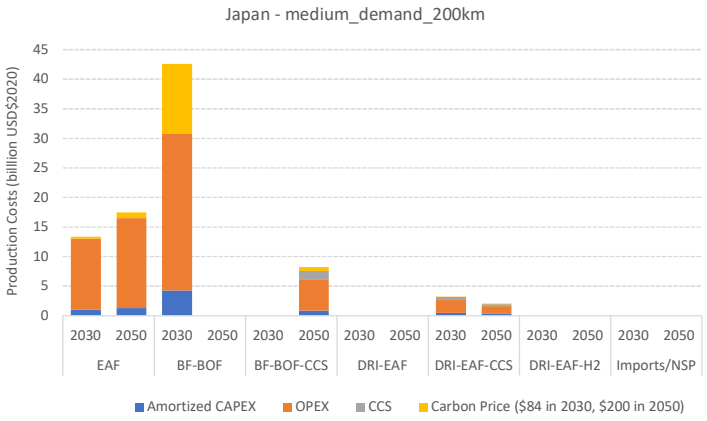
• CAPEX investment decreases by 49% from 2020 to 2050 in the central scenario.

• EAF contributes to the largest share of CAPEX investment, 48% in 2050 in the central scenario.

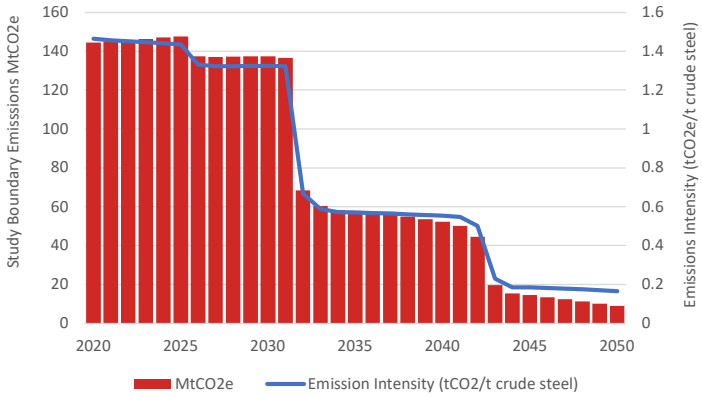
• Total production costs in 2020 $USD are estimated to be $59 billion in 2030 and $28 billion in 2050 for the central scenario.

• CAPEX costs are projected to be 9% of overall production costs in 2050 for the central scenario.

• This doesn't include potential investment for green steel exports that Japan could compete for to supply 175 megatonnes of global demand by 2050 for green steel that is non-spatially allocated in the model.



Emissions Transition



• Cumulative emissions between 2030 and 2050 are 2,418 MtCO2e (Range for scenarios is 2,350 to 2,468 MtCO2e.)

• Emission intensity of production falls from 1.46 tCO2e/tonne of crude steel in 2020 to 0.16 tCO2e/tonne of crude steel in 2050.