Net Zero Steel

South Korea Country Profile - Netzero Steel Project

www.netzerosteel.org/countries-results/

The Netzero Steel Project considers the geo-spatial evolution of production of 12 existing facilities in South Korea described in the GEM database that account for 86% of 2019 production, as well as 3 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.

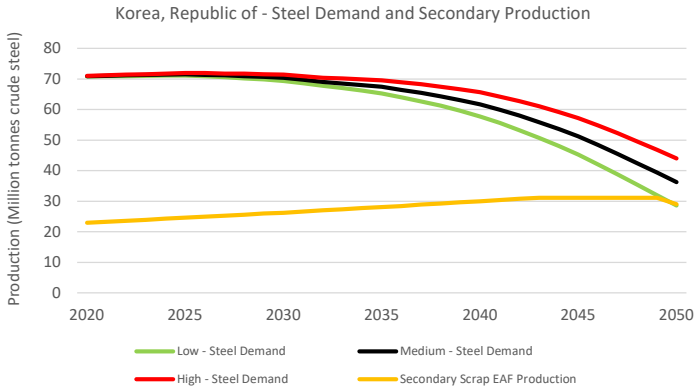
All the nine modelled scenarios (3 demand scenarios) and (3 CCS pipeline length scenarios) reduce overall emission intensities from an estimated existing emission intensity of 1.36 tCO2e/tonne of steel in 2019 to 0.16 tCO2e/tonne of steel in 2050. This compares to a global average of 1.58 in 2019 and 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

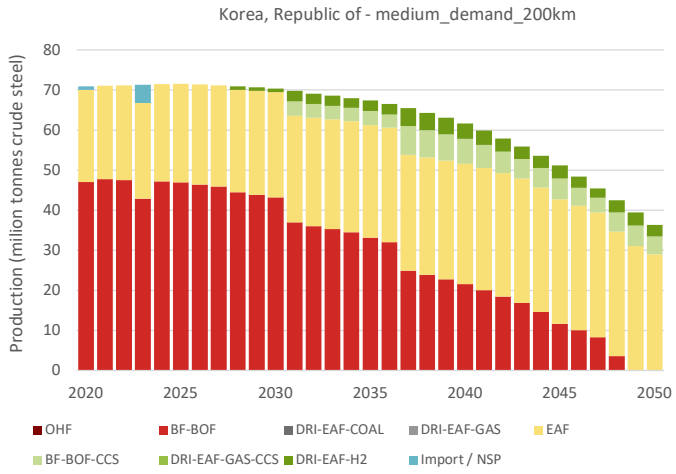
• In the medium demand scenarios South Korea's steel demand decreases 49% between 2020 and 2050.

• low/medium/high scenarios in 2050 correspond to 643/815/989 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 42% in 2020 to 80% in 2050 in our central scenario. This compares to the projected global average of 46%.



Technology Transition



• By 2041 more than half of South Korea's production is projected to be low carbon in the central scenario.

• DRI-EAF-H2 rises in market share from zero in 2029 to 8% in 2050 in our central scenario (range of scenarios is 0% to 10%).

• Steel production with CCS retrofit accounts for 12% of production in the 2050 central scenario (range of scenarios is 12% to 29%).

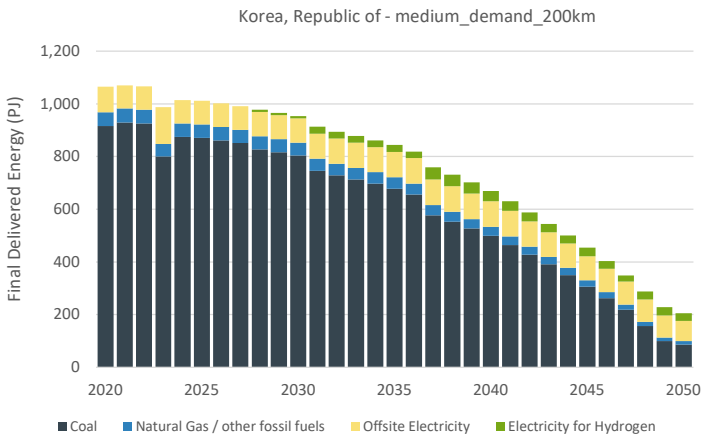
• The modelled pathways do not show significant imports of green steel for South Korea. Global demand for imports in other countries and regions suggests that South Korea could compete for exports to supply 175 megatonnes of demand by 2050 for green steel that is non-spatially allocated in the model.

Energy Transition

• Facility energy demand for fossil fuels falls by 90% by 2050 in the central scenario (range of scenarios is 73% to 92%).

• Electricity demand rises to 29 TWh in 2050, a rise from current levels of 1.1x by 2050 in the central scenario (range of scenarios is 0.6x to 1.4x). For comparison, electricity demand in 2050 represents 5% of current total electricity demand in South Korea.

• Electricity demand for hydrogen rises to 8 TWh by 2050 in the central scenario (range of scenarios is 0 to 12 TWh).



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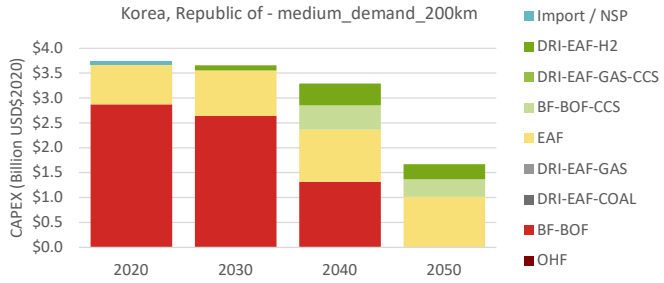
Investment Transition



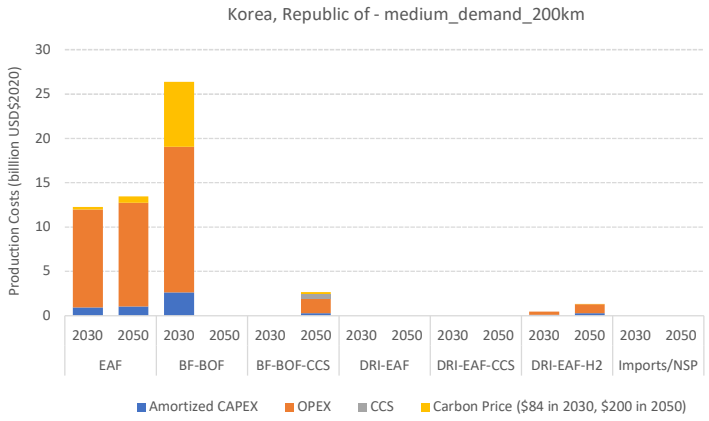
• CAPEX investment decreases by 55% from 2020 to 2050 in the central scenario.

• EAF contributes to the largest share of CAPEX investment, 61% in 2050 in the central scenario.

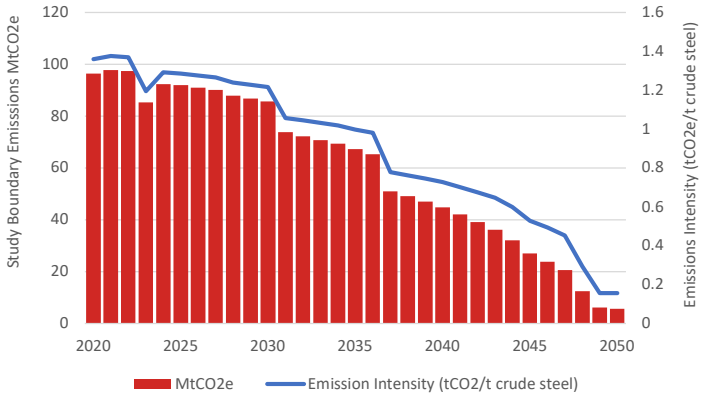
• Total production costs in 2020 $USD are estimated to be $39 billion in 2030 and $17 billion in 2050 for the central scenario.

• Amortized 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 South Korea 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 1,857 MtCO2e (Range for scenarios is 1,795 to 1,902 MtCO2e.)

• Emission intensity of production falls from 1.36 tCO2e/tonne of crude steel in 2020 to 0.16 tCO2e/tonne of crude steel in 2050.