

Pakistan Country Profile - Netzero Steel Project

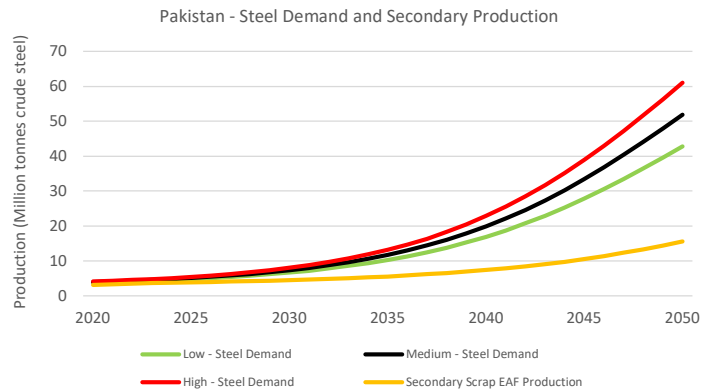
www.netzerosteel.org/countries-results/

The Netzero Steel Project considers the geo-spatial evolution of production of 2 existing facilities in Pakistan described in the GEM database that account for 20% of Pakistan's 2019 production, as well as 2 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.

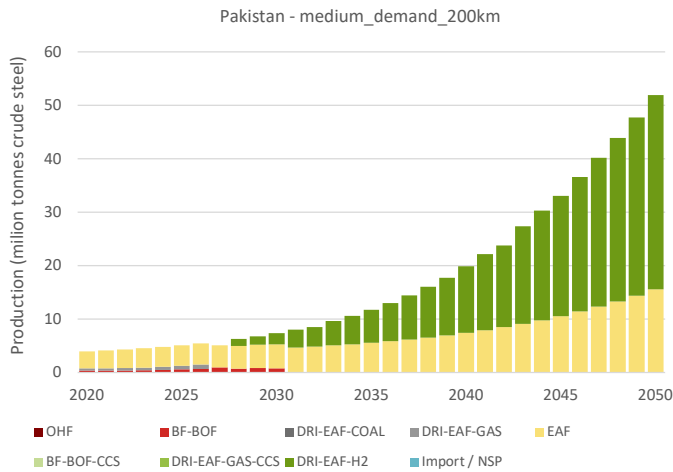
All the nine modelled scenarios (3 demand scenarios) and (3 CCS pipeline length scenarios) reduce overall emission intensities from an estimated existing emission intensity of 0.42 tCO₂e/tonne of steel in 2019 to 0.12 tCO₂e/tonne of steel in 2050. This compares to a global average of 1.58 in 2019 and 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 Pakistan's steel demand increases 1207% between 2020 and 2050.
- low/medium/high scenarios in 2050 correspond to 125/151/178 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 falls from 65% in 2020 to 30% in 2050 in our central scenario. This compares to the projected global average of 46%.



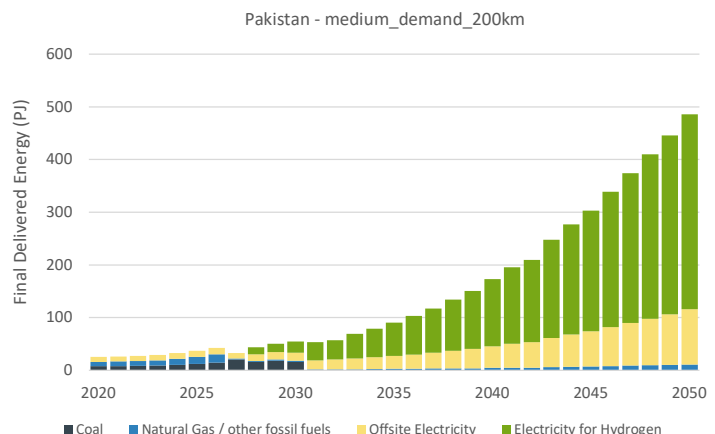
Technology Transition



- By 2031 more than half of Pakistan's production is projected to be low carbon in the central scenario.
- DRI-EAF-H2 rises in market share from zero in 2027 to 70% in 2050 in our central scenario (range of scenarios is 64% to 74%).
- Steel production with CCS retrofit does not appear in any modelled scenarios.

Energy Transition

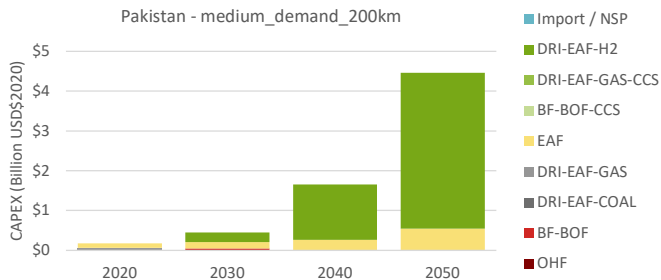
- Facility energy demand for fossil fuels falls by 30% by 2050 in the central scenario (range of scenarios is 20% to 40%).
- Electricity demand rises to 132 TWh in 2050, a rise from current levels of 53.4x by 2050 in the central scenario (range of scenarios is 42.4x to 63.6x). For comparison, electricity demand in 2050 represents 92% of current total electricity demand in Pakistan.
- Electricity demand for hydrogen rises to 103 TWh by 2050 in the central scenario (range of scenarios is 77 to 129 TWh).



Net Zero Steel

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Investment Transition

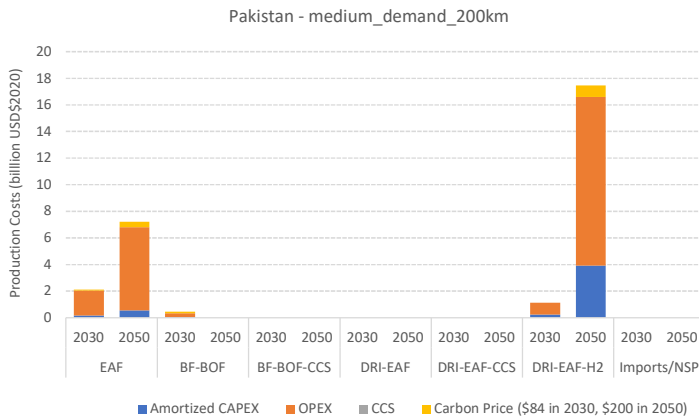


- CAPEX investment increases by 2583% from 2020 to 2050 in the central scenario.

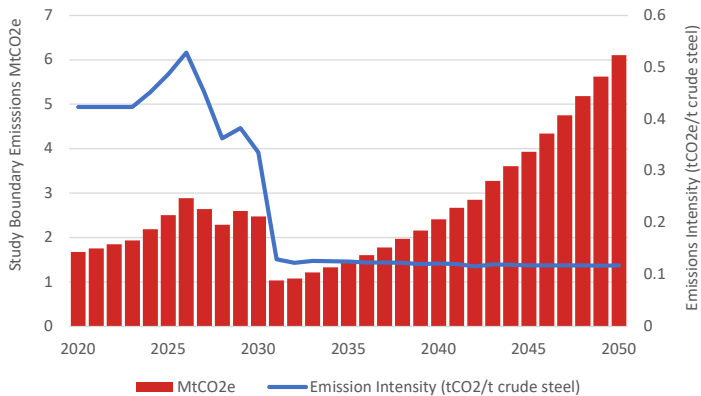
- DRI-EAF-H2 contributes to the largest share of CAPEX investment, 88% in 2050 in the central scenario.

- Total production costs in 2020 \$USD are estimated to be \$4 billion in 2030 and \$25 billion in 2050 for the central scenario.

- Amortized CAPEX costs are projected to be 18% of overall production costs in 2050 for the central scenario.



Emissions Transition



- Cumulative emissions between 2030 and 2050 are 83 MtCO2e (Range for scenarios is 73 to 95 MtCO2e.)

- Emission intensity of production falls from 0.42 tCO2e/tonne of crude steel in 2020 to 0.12 tCO2e/tonne of crude steel in 2050.