Net Zero Steel

NET-ZERO STEEL PRODUCTION BY 2050

IS POSSIBLE BY SEVERAL DIFFERENT MEANS, BUT WE MUST ACT SOON TO MAKE IT POSSIBLE

POLICY SUMMARY

This project has several implications for global and national climate policy with regards to steel use and demand:

- Our low & medium demand and recyclable scrap forecasts imply building code, design & recyclability policies for material efficiency/circularity. Vehicles, buildings, & infrastructure need to be designed to be taken apart at end-of-life in a way that allows high quality, low contamination recycling, especially with copper wiring.

- It requires crystal clear communication to steel makers that no more BF-BOFs without 90% CCS can be built past 2025, and that they should be planning for near zero emissions alternatives. This requires a multi-level policy commitment to transition to net-zero GHG industry. This in turn requires a transition pathway planning process including all key stakeholders (e.g., steel firms, finance, unions, communities, governments) to assess strategic & tech options, competitive advantages, and uncertainties.

- Starting the process of clean replacement in the late 2020s requires a fast and effective global innovation process to commercialize green hydrogen direct reduced iron, which is underway in Europe and will likely meet the 2028 goal for several plants being operating, and BF-BOF CCS, which is arguably going too slowly to meet the 2030 goal. This implies accelerated R&D and commercialization. Lead markets can be created with partners to build economies of scale using public and private green procurement, content regulation, supply chain branding, and limited but guaranteed pricing or output subsidies (e.g. contracts for difference per tonne iron or steel produced, varying with GHG).

- If there are innovation blockages, e.g., lowering the cost of electrolyzers or getting post combustion CCS to work for BF-BOFs, targeted innovation & early commercialization programs may be needed to identify and break commercialization blockages, like the UK Offshore Wind Accelerator or the US ARPA-E.

- A syngas direct reduced iron EAF facility with CCS is operating in Abu Dhabi, indicating some level of CCS could occur (the CO_2 is used for enhanced oil recovery, but the geological disposal could be permanent if sealed properly). This requires spatial planning and investment to get the necessary rights-of-ways in place for the necessary CO_2 pipelines or other transport.

- Even with a firm commitment to CCS, some amount of green hydrogen DRI investment is likely to take place, requiring additional investment in solar, wind or other clean electricity generation. Overnight hydrogen storage will be required as well. This can be reduced by importing reduced green iron from countries with iron ore and excess capacity for clean electricity (e.g., Australia, South Africa, Brazil).

- If it takes too long to commercialize low emissions technologies or to mandate their use, and high intensities facilities are built in their place into the 2030s, early retirements may be necessary.

Project summary, full report and country data available at netzerosteel.org