

The Iron & Steel Manufacturing Sectors can rely on the lightest element to reach the net-zero goals. Discuss.

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India is second largest producer of steel & Iron. As steel industry emits 9.1% of total Green house gas emissions, it needs to be mitigated.

To achieve net-zero goals (i.e. the producing & consuming capacity of  $CO_2$  will be same), India has set a target by 2070. This essentially lays down a long term roadmap for investors & companies in India's industrial sector. However, As India is also looking to increase its steel manufacturing capacity to 500 million tonnes per annum by 2030, consumption of coal, emission footprint and import dependency is set to increase manifold.

To counter this induction of Green Hydrogen (obtained from splitting of water using solar & wind power) offers a cleaner alternative for producing steel. This can also help deduce the sector's dependence on imports of coking coal.

The trilemma of cost competitiveness, lower emissions footprint through phase down of coal, and self reliance could be solved through following pathways:-

First, green hydrogen can replace part of the existing fuel in coal & gas-based iron-making processes. There are two main pathways for coal based iron making required for manufacturing steel, the Blast furnace method in which iron ore is melted to make steel, the secondary kiln route where iron ore is reduced to iron without melting. Green hydrogen can reduce 15-20% percent of energy consumption in Blast furnace.

Mixed use of shaft furnace & green hydrogen can lead to 100% replacement. Eventually this can lead to 28 million tonnes reduction of  $CO_2$ . Second, policy shift of Govt from Blast furnace to Green hydrogen is need of time. Steel producers should also be encouraged to blend grey hydrogen with green hydrogen & grid electricity with renewable power. This can lead to 60% reduction in emission.

Additionally there is need of market creation for green steel to provide an impetus for steel producers to engineer the switch to hydrogen based steel-making. Govt. funded schemes like SRTMI (Steel Research & Technology Mission of India) and R&D should be encouraged in field of Green Hydrogen to explore its maximum potential. As there is huge space to phase of steel in infrastructure projects & housing like PM Awas, Bharatmala, Jal Jeevan Mission, Govt. must nudge manufacturers towards the transition. Government tenders should specify the carbon intensity of steel.

The scale of the sector's potential for growth provide a significant opportunity for ushering in green hydrogen economy in India & will help achieve its net-zero emission goal by 2070.