Decarbonisation of Chinese heavy industry – Status, prospects and international competition

Isadora WANG

Senior Advisor China Industry, Agora Industry and Agora Energy Transition China

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Carbon intensive industrial sectors facing serious decarbonisation requirements from the Chinese government

- China is to cover steel, cement, and aluminum in its national Carbon Trading Scheme (ETS) by the end of 2024.
- China started to emphasise the use of renewable hydrogen to replace fossil in steel, oil-refining, and coal chemical manufacturing.
- China has suspended the approval of new steel production capacity in Aug 2024.
- China promotes circular economy with a series of policies
  - China Resources Circulation Group founded on 18 October 2024, with its business portfolio focusing on scrap and ferrous metal circulation, processing of used plastics, retired batteries, and wind/solar power equipment recycling.
  - National debts to boost the renewal of large-scale equipment and consumer goods, especially electric equipment, industrial/agri machines, commercial ships/cars and white appliances.
  - China Iron and Steel Association is to establish a sub-association for electric arc furnaces (EAF) development.

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H2 development policies in China have successfully fostered production and FCEVs, next step is industrial application

- 2019.3.26 China kept the subsidies for FCEVs while canceling those for Evs
- 2022.3.23 Medium and Long-term Development Plan for Hydrogen Industry calls for support of FCEVs and refilling stations
- 2023.8.8 Guildlines for Building Hydrogen Industry Standard System, emphasing production, storage, transporatation and application.
- 2024 Local governments issuing subsidies for by-product or green H2 production, refilled H2 price and highway fee exemption for FCEVs.

Photo credit: Rongcheng Steel, Baowu Group

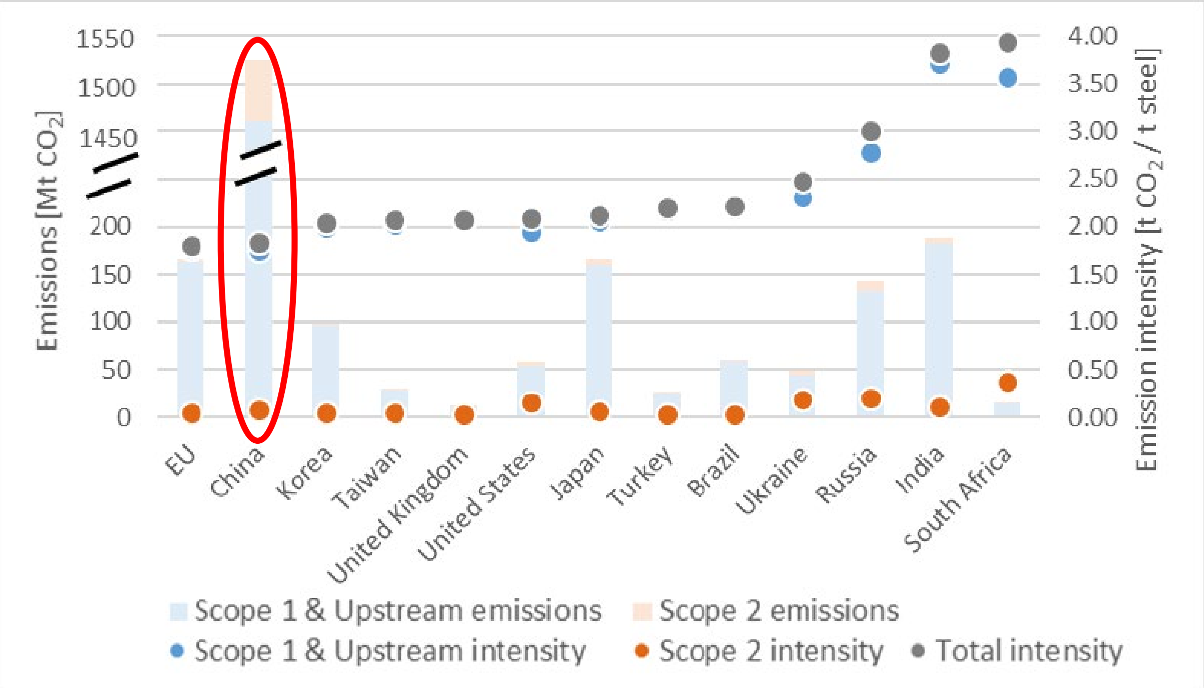
Two Pilot H2-DRI projects running in China

- HBIS started operating its 600,000 ton DRI plant using coke oven gases in May 2023, saving 0.8 million tons of CO2 emissions each year
- Baowu Zhanjiang H2-DRI plant uses high proportion of H2 outsources from chemical companies. Operation started in December 2023, with annual capacity of 1 million tons.

CCUS, CO2 circulation in BFs, Fluid-bed H2 reduction are all under demonstration or R&D by different steel makers.

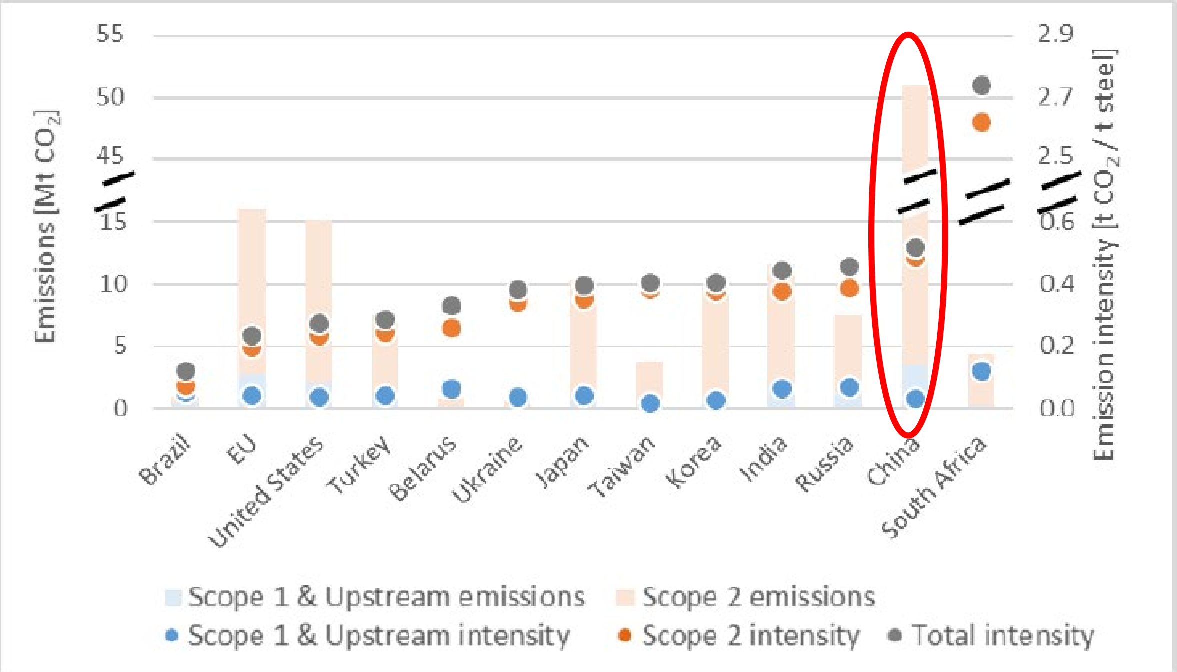
Carbon intensity of Chinese steel is not the highest compared with other exporters, but electricity emissions are significant

Carbon intensity of major steel exporters to the EU, Integrated route



Source: JRC.

Carbon intensity of major steel exporters to the EU, EAF route



Source: JRC.

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Steel companies‘ efforts to reduce indirect emissions by deploying renewable electricity and efficiency improvement

Steel companies ranks top for green electricity purchase

- Taiyuan Steel bought 1100 GWh green electricity in 2022, ranking first in China.
- BaoSteel, 1610 GWh in 2023, ranking 2nd.

2023 Chinese company green electricity purchase

Photo: BNEF

- Jinnan Steel uses rooftops, walls, and water surfaces to install 100MW distributed solar PV
- ShaSteel Group’s 5.9MW solar feeds into the grid
- Baosteel generates 1400 GWh/a in its Zhanjiang, Taiyuan and Baoshan sites with 165MW solar

- 3-Year Action Plan for Steel Sector Energy Efficiency Benchmark (2022.12.9) targets 150-200 mt to reach benchmark efficiency and 200-300 mt by 2025.
- Action Plan for Energy Conservation and Decarbonisation 2024-2025 (2024.5.29) calls for 30% of steel capacity to reach benchmark value. Least efficient ones will be banned from production.

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Thank you

isadora.wang@agora-energy.com

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