

HBIS practice and action plans for low-carbon development

-  **01 China's low-carbon development**
-  **02 Low-carbon development of the Chinese steel industry**
-  **03 Practice and action plan of HBIS for low-carbon development**

Background of low-carbon development – Three milestones

□ **United Nations Framework
Convention on Climate Change** □ (1992)



□ **Kyoto Protocol** □ (1997)



□ **Paris Agreement on Climate Change** □ (2015)

For the first time, set a specific target for limiting global warming to well below 2° C above the pre-industrial levels of 1750, and pursue efforts to limit temperature increase even further to 1.5 ° C.



China's low-carbon commitment – Intended Nationally Determined Contributions submitted to the UN in 2015

A set of commitments to be reached by 2030:

- to achieve peak CO₂ emissions (and to make every possible effort to peak earlier);
- to lower CO₂ emissions per unit of GDP by 60 to 65 percent from the 2005 level;
- to increase the share of non-fossil energy in primary energy consumption to around 20%;

Speed up low-carbon development path - At the 75th session of the United Nations General Assembly (Sept. 2020)

Chinese President Xi announced:

China is willing to contribute more to fight against climate change, as it aims to bring carbon emissions to a peak by 2030, and achieve carbon neutrality by 2060 with more forceful policies and measures.



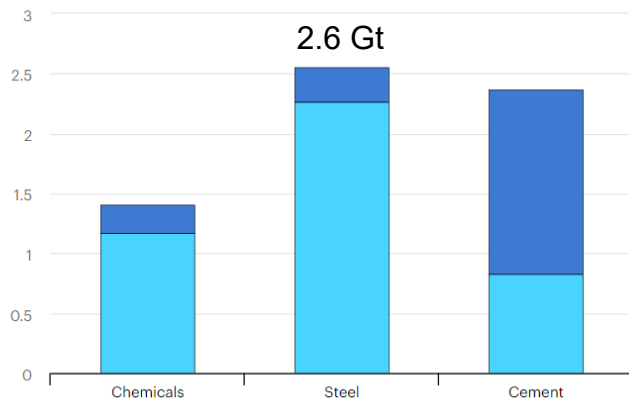
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2 Low-carbon development of the Chinese steel industry

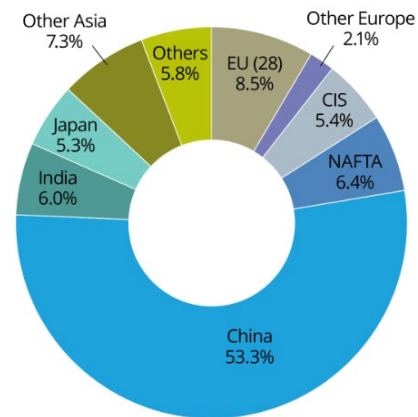
Low-carbon development of the Chinese steel industry is imperative.

Direct CO₂ emissions from selected heavy industry sectors, 2019 (IEA)

GtCO₂ per year

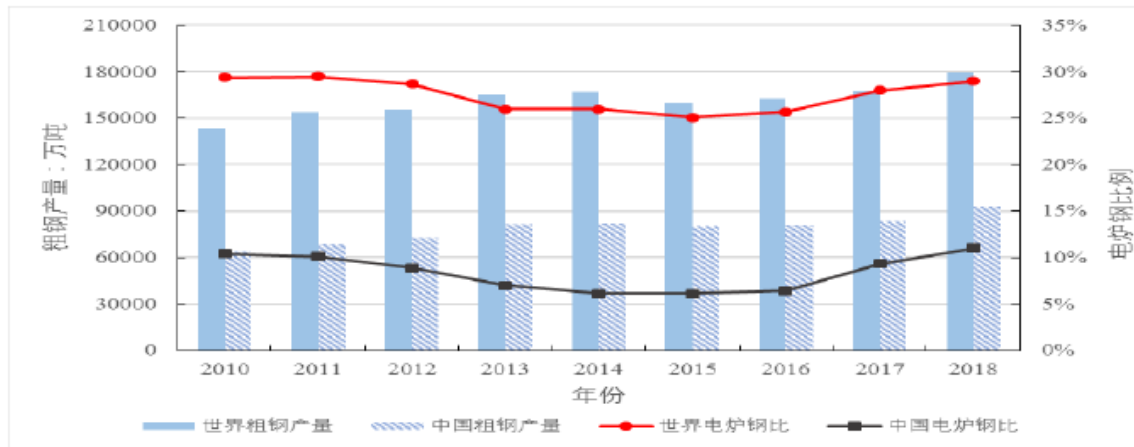


WORLD TOTAL: 1 869 MILLION TONNES



- Among heavy industries, the iron and steel sector ranks first when it comes to CO₂ emissions.
- The iron and steel sector directly accounts for 2.6 Gt CO₂ emissions annually, 7% of the global total.
- As the largest steel producing country, China produces about 50% of the world's total crude steel.

BF-BOF route dominates the steel production process in China.



- The CO₂ emission intensity of BF-BOF route is nearly 3 to 4 times higher than EAF route.
- In 2019, BF-BOF steelmaking route accounted for 89.6% of China's total crude steel output, while EAF route accounted for 10.4%.
- As for capacity replacement project, Govt. encourages steel companies to develop EAF capacity.

Establishment of nationwide carbon emission trading system

Carbon emission trading pilots

- Seven carbon emission trading pilots, including 5 cities (Beijing, Tianjin, Shanghai, Chongqing, Shenzhen) and 2 provinces (Hubei and Guangdong), were established by 2014.
- Carbon trading pilots covered energy-intensive and CO₂ emission intensive industries, including power generation, steel, cement, etc.

National ETS Phase 1

- National carbon emission trading system (ETS) was established in China in 2017.
- At phase 1, only power generation sector was included.

National ETS Phase 2

- China will step up the launch of nationwide ETS in the period from 2021 to 2025 and expand from single sector to multiple sectors.
- Steel industry may be included in nationwide ETS during this period.

Ultra-low emissions in the Chinese steel industry

In April 2019, five ministerial depts. jointly issued 《Guidance on Promoting the Implementation of Ultra-Low Emissions in the Iron and Steel Industry》

- **Main targets:** By end-2025, nationwide over 80% capacity should complete the transformation and reach ultra-low emission standards.
 - The Ultra-Low Emission Limit Values (ELVs) are among the **most stringent ELVs globally**.
 - Cover all production processes, including raw material yard, sintering, pelletising, coking, iron-making, steel-making, rolling, captive power plants, and bulk material transportation.
 - Clean transportation (railway, waterway, pipeline, etc.) of raw materials and products accounting for over 80%.
- According to CISA statistics in Nov. 2020, 229 steel producers nationwide, with a **total C. S. capacity of 620 Mt/a**, are carrying out upgrades to meet ultra-low carbon emission standards.

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HBIS at a Glance

Crude steel
output

46.6
Mt



No. 218 in 2020
Fortune 500

Total Asset

462
billion RMB



No. 59 in China Top 500
No. 18 in China Top 500
manufacturing companies

Revenue

354
billion RMB



Strong comprehensive
competitiveness by
MPI

Tax Payment

43.4
billion RMB



Chairmanship
(2019-2021)

Total
employees

127000+



No. 35 in China Top 100
multinational companies

Snapshots of HBIS green development



**TangSteel site recognised
as the cleanest steel plant**



**Water treatment center, won worldsteel
Excellence in sustainability Steelie Award**



**TangSteel New District-
Fully enclosed unmanned stockyard**



Enclosed silos for coal storage



**Enclosed stockyards across
all steel-making subsidiaries**

Roadmap of carbon emission peaking and carbon emission neutrality

Four stages: carbon peak, steady reduction of carbon emissions, further reduction of carbon emissions, and in-depth decarbonisation, to achieve carbon peak by 2022 and carbon neutrality by 2050.

- **2021** Release roadmap for carbon peaking and carbon neutrality
- **2022** Reach carbon peak
- **2025** Reduce carbon emissions by 10% or above, as compared to carbon peak
- **2030** Reduce carbon emissions by 30% or more compared to carbon peaking
- **2050** Reach carbon neutrality



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**Implementation
pathways and
technological
solutions**

Optimise industrial layout and process structural reform, and promote carbon emission reduction throughout the whole production process

Optimise energy use and build multi energy structural systems to accelerate low carbon transformation

Carry out life cycle assessment to improve steel materials' performance and life span

Build a low carbon circular economy industrial chain to achieve synergised carbon reduction

Advance low carbon technology R&D and implementation through science and technological innovation

Advocate low carbon production and lifestyle among all employees



Carbon Asset Management Corporation

- Back in May 2017, in response to China's intention to build a nationwide ETS, HBIS Group took the lead to set up a carbon asset management company.
- The company is positioned to "tap the asset attributes of carbon quotas, use financial tools to maintain and increase its value, and serve the group's low-carbon development strategy."
- Much work has been done, including personnel training, improvement of management and control systems, establishment of carbon data management platform etc., to prepare for the national carbon trading market.

河钢集团有限公司

集团〔2019〕28号

河钢集团有限公司 关于就碳资产管理制度征求意见的 通 知

各相关单位:

为积极响应国家号召,加快推进集团碳资产管理工作程序化、科学化、规范化开展,抢抓碳资产市场发展先机,集团制定了《河钢集团碳资产管理办法》、《河钢集团碳排放管理办



Development of CCUS frontier technologies

Tech1

CCUS technology for steel industry

- A joint HBIS-UQ (University of Queensland) Innovation Centre for Sustainable Steel was established in 2016, to develop a full-chain process integrated CO₂ capture, utilisation and storage (CCUS) technologies with steelmaking processes for HBIS.
- CCUS Technology development during the period of the 14th Five-Year Plan (2021-2025):
 - ❑ Cooperate with the Chinese Academy of Sciences, the top Chinese R&D institute, to study CO₂ capture and utilisation technologies.
 - ❑ To explore efficient and cost-effective CO₂ capture and separation technologies and come up with a strategic roadmap for CCUS application in the steel industry.

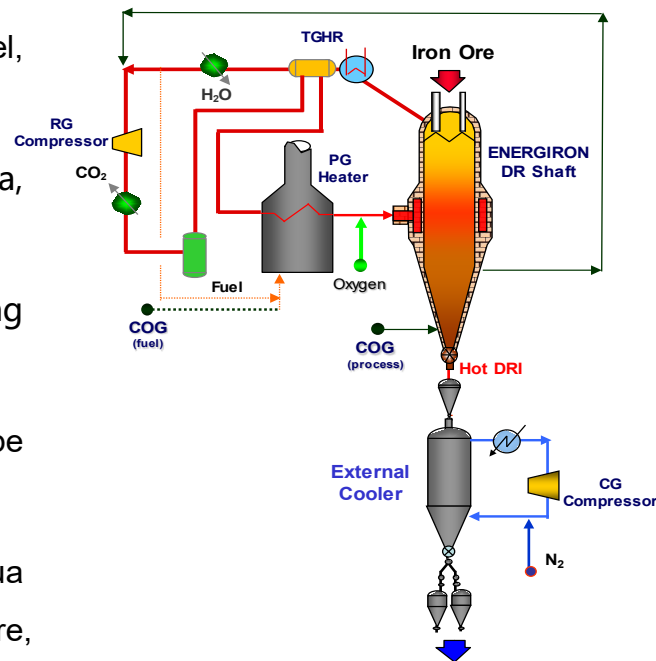
Stride into the hydrogen era - hydrogen refueling demonstration station

- Hydrogen source: coke oven gas, which contains 60% hydrogen.
- In August 2020, the first HBIS hydrogen refueling demonstration station was put into operation, the first permanent hydrogen refueling station operated by a steel company in China.
- The country's first 49-tonne hydrogen fuel cell heavy truck entered operation in parallel, making a complete green and recyclable industrial logistic system.
- Located at the HBIS HanSteel site, the station has a daily refueling capacity of 500 kg with 35MPa and 70 Mpa pressure and can fill nearly 20 49-tonne hydrogen fuel cell trucks.
- Second H₂ station came onto stream in HBIS TangSteel site this October.



Hydrogen energy development and utilisation demonstration project

- To build China's first 1.2 Mt/a hydrogen DRI plant in HBIS XuanSteel, Zhangjiakou City.
 - ❑ Phase 1: hydrogen source-coke oven gas, capacity 0.6 Mt/a, end-2021
 - ❑ Phase 2: hydrogen source-electrolytic hydrogen making through clean distributed energy, capacity 0.6 Mt/a
- With Hydrogen DRI + EAF steelmaking route, CO₂ emission will be reduced by 40%-60% compared to traditional BF-BOF route.
- Through this demonstration project, HBIS is planning to build Xuanhua Area, Zhangjiakou City, into a hydrogen energy technology radiation centre, to propel the global steel industry into the hydrogen era.



Upgrading and transformation of urban steel plants

Process
reform

New HBIS ShiSteel Mill

Switch from BF-BOF steelmaking
to a new generation of
green low carbon EAF mill



Relocation

New HBIS TangSteel Mill

Create a new generation of integrated
steel plant featured green, intelligence
and brand in coastal area

Transformation
and upgrading

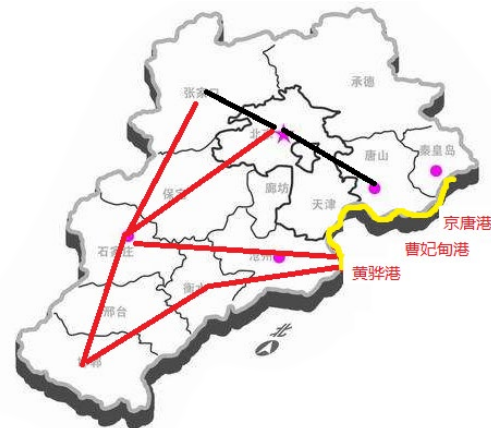
XuanSteel: High-tech base

Build a high-end core component
manufacturing base and hydrogen
steelmaking demonstration project



Advance the global steel industry to move into the hydrogen era (2021-2025)

- To build hydrogen refueling station network in Beijing-Tianjin-Hebei Region.
- By 2025, **14 hydrogen and gas refueling stations** will be built, with the capacity to serve more than 1,000 hydrogen fuel cell vehicles and 6,000 LNG vehicles per day. This will make a breakthrough in the process of **replacing diesel trucks with hydrogen fuel cell trucks** in the region.
- To advance R&D on hydrogen steelmaking technology and build a global hydrogen metallurgy R&D centre.
- Three hydrogen DRI projects, located in Zhangjiakou, Tangshan, and Handan, respectively, will be completed with a capacity of 1.2Mt/a each, to provide green and high-quality materials for domestic EAF production.





Forward, for world
创造无限 超越可能

*HBIS low carbon development philosophy: **human beings, steel and environment co-exist in harmony.***

*Focusing on process reform, relocation, upgrading and transformation, energy efficiency improvement and cutting-edge low carbon technologies, HBIS is aiming to build itself into a new generation of steel company featured **green, intelligence and brand**, playing an exemplary role for the green, low carbon and sustainable development of the global steel industry.*