



Carbon Neutral Vision 2050

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FY2023 AJSI Webinar

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Carbon Neutral Vision 2050



NIPPON STEEL

Our Carbon Neutral Vision 2050, a part of Mid- to Long-Term Management Plan published in March 2021, is aligned with the ambitious national policy to aim for 2050 carbon neutrality.

Two core values that our Carbon Neutral Vision provides

-  ✓ Provision of high-value-added products and energy-saving solutions that contribute to the reduction of CO₂ emissions from whole society
-  ✓ Decarbonization in steel making processes
- ✓ Provision of Carbon Neutral Steel

Contribution to customers' reduction in CO₂ emissions from manufacturing process

Contribution to end-users' reduction in CO₂ emissions

Contribution to reduction in supply chain CO₂ emissions

We will provide high-value-added products and energy-saving solutions and develop decarbonized steel making process ahead of the other countries to provide Carbon Neutral Steel, thus enhancing the global competitiveness of approx. 6,000 domestic customers.



NIPPON STEEL
Green Transformation
initiative



Launch of Carbon Neutrality Brands



NIPPON STEEL

Providing two types of values by progressing toward carbon neutrality



Nippon Steel + Carbon dioxide less + X
 Nippon Steel offers Products and technical solutions that contribute to reducing CO₂ emissions For realizing a sustainable future



Advanced products and technical solutions that contribute to reducing CO₂ emissions in society

Steel products certified as reducing CO₂ emissions in the steelmaking process

Reduce CO₂ emissions at the time of production and processing by customers

Reduce CO₂ emissions at the time of use of customers' products made from our steel

Contribute to energy conversion in society

Reduce CO₂ emissions in customers' supply chains

By providing the two types of values, we support international competitiveness of our customers (including approx. 6,000 companies in Japan)

Contribution of Our Technology and Products to Decarbonization of Whole Society – Installation of Next-Generation Hot Strip Mill and Production of Ultra-High-Tensile Steel Sheets



Ultra-High-Tensile Steel Sheets

We call steel sheet with a tensile strength above 1.0GPa “ultra-high-tensile steel”, which helps reduce vehicle weight and thus contributes to energy saving while also ensuring vehicle sturdiness and thus improves safety in the event of a vehicle crash. Its controlled crystal structure provides both strength and formability.

The social needs for carbon neutrality

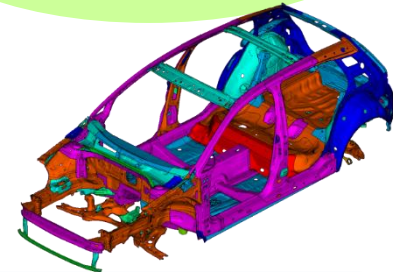
The social needs for safety

Further stricter world-wide regulation for fuel consumption of internal combustion vehicles

Needs for more lightweight bodies for xEVs (for mileage and battery weight)

Stricter collision safety standards

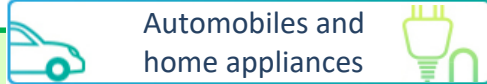
Demand for ultra-high-tensile steel sheets that contribute to more lightweight and stronger bodies of vehicles and to easier processing is expected to increase



A next-generation hot strip mill is to be installed at Nagoya Works, one of our major steelworks where automobile steel sheets are manufactured, to fundamentally strengthen manufacturing framework for high-value-added steel sheets such as ultra-high-tensile steel sheets. The hot strip mill will have the highest pressure rolling machine in the world and dramatically improved rolling and temperature controllability that are developed over the long years of our pursuit of the potential of steel by the R&D Div..

Investment amount : approx. 270.0 bn. JPY / Production capacity : approx. 6.0 million tons/year
Start of operation : 1Q FY2026 (planned) (After the full operation of new hot strip mill, the existing mill will be terminated)

NSCarbolex™ Solution: Product and Solution Lineups



Automobiles and
home appliances

- CO₂ reduction in manufacturing processes
- CO₂ reduction in product use, etc.

NSafe™-AutoConcept

Contributes to making lightweight vehicles by providing high-strength steel and our original processing techniques
Contributes to CO₂ reduction in manufacturing process and vehicle rides



Steel for high-strength gear

Its high strength allows omitting annealing processes at customers and contributes to making vehicles lightweight
Contributes to CO₂ reduction in manufacturing process and vehicle rides



Hairline finished electrolytic
zinc-nickel alloy plated steel sheet

FeLuce™

Exquisitely designed surface allows omitting additional surface treatment
Contributes to customers in reducing CO₂ by cutting processes



High-efficiency electrical steel sheet

Reduces energy loss in electric devices
Reduces CO₂ emissions from use of automobiles and home appliances
Improves power transmission efficiency



Energy

Contribution to energy transition in society
Energy saving in electricity transmission etc.

Steel for LNG tank



Its high resistance to extreme low temperature contributes to construction of highly safe LNG tank
Contributes to expansion of LNG use

Stainless steel pipe for high-pressure hydrogen

HYDREXEL™



Its high strength and easy welding features contribute to construction of hydrogen stations
Contributes to the future hydrogen-based society

High-alloy OCTG



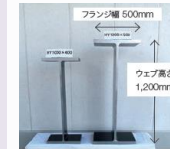
Its world-class resistance to corrosion contributes to welling in high-concentrate CO₂ environment
Contributes to CCS development



Infrastructure

CO₂ reduction in construction processes
Improvement in energy efficiency in railway, etc.

Mega-sized fixed external dimension H-section steel
MEGA NSHYPER BEAM™



Shortens construction period, saves construction materials, and thus reduces CO₂ emissions from construction processes

High-speed railway wheels and axles



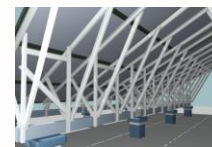
Strong and lightweight features reduce CO₂ emissions from trains by reducing their body weight

Designing titanium **TranTixii™**



Aesthetic colors and design is added to the surface of corrosion resistant, strong and lightweight titanium
Contributes to CO₂ reduction in construction and maintenance of buildings

Corrosion resistant coated steel **ZEXEED™**



Prevents corrosion even in severely corrosive situation
Enables omitting of coating
Enhances durability of solar power generation mount
Reduces CO₂ emissions from customers' manufacturing maintenance processes

Our CO₂ emissions reduction scenario

2030 Target

30% or more reduction in total CO₂ emissions vs. 2013

[Means]

- Actual implementation of the COURSE50 in the existing BF and BOF process
- Reduction of CO₂ emissions in existing processes, establishment of an efficient production framework.

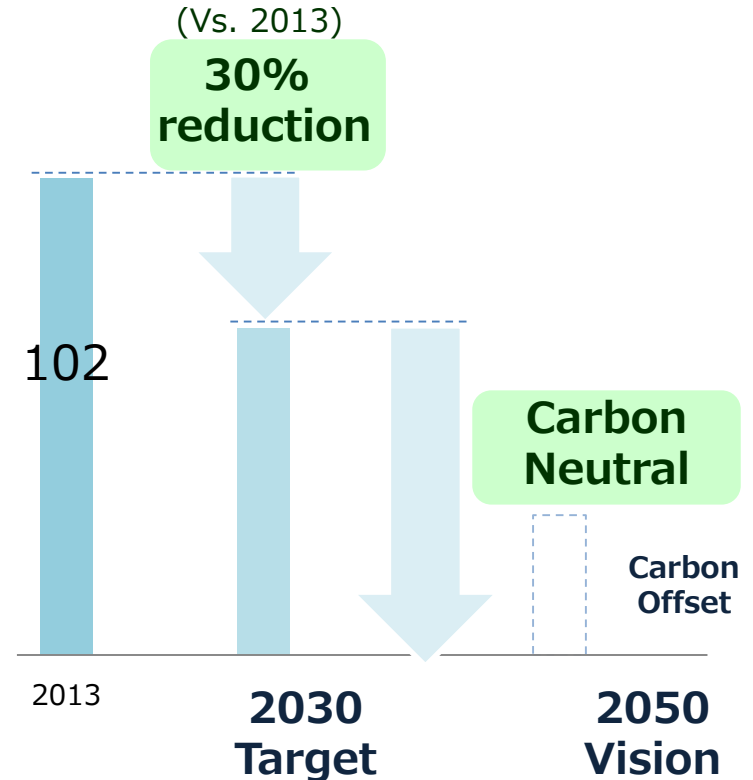
Vision 2050

Aim to achieve carbon neutral

[Means]

- Three Ultra-innovative Technologies
 - 1)Hydrogen injection into blast furnaces (Super-COURSE50)
 - 2)Mass-production of high-grade steel in large size EAFs
 - 3)Direct reduction with hydrogen
 - CCUS* and other carbon offset measures
- > Aim to achieve carbon neutral by multiple approaches

Total CO₂ emissions (MT/Y)



[Scope of Scenario]

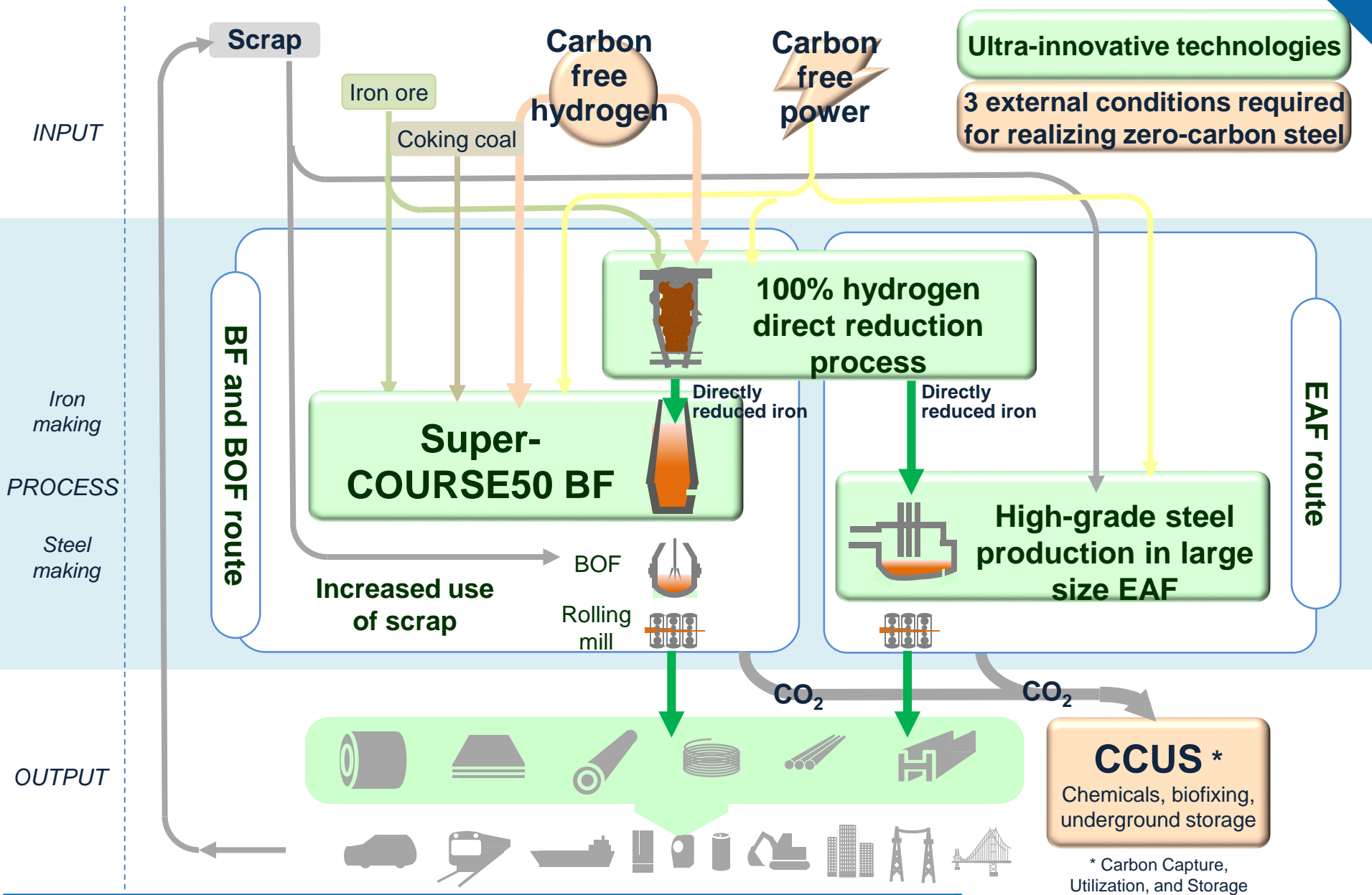
Domestic

SCOPE I + II

(Raw material procurement to product shipment) + (CO₂ at the time of purchase power production)

*Carbon dioxide Capture, Utilization, and Storage

Carbon neutral steelmaking process



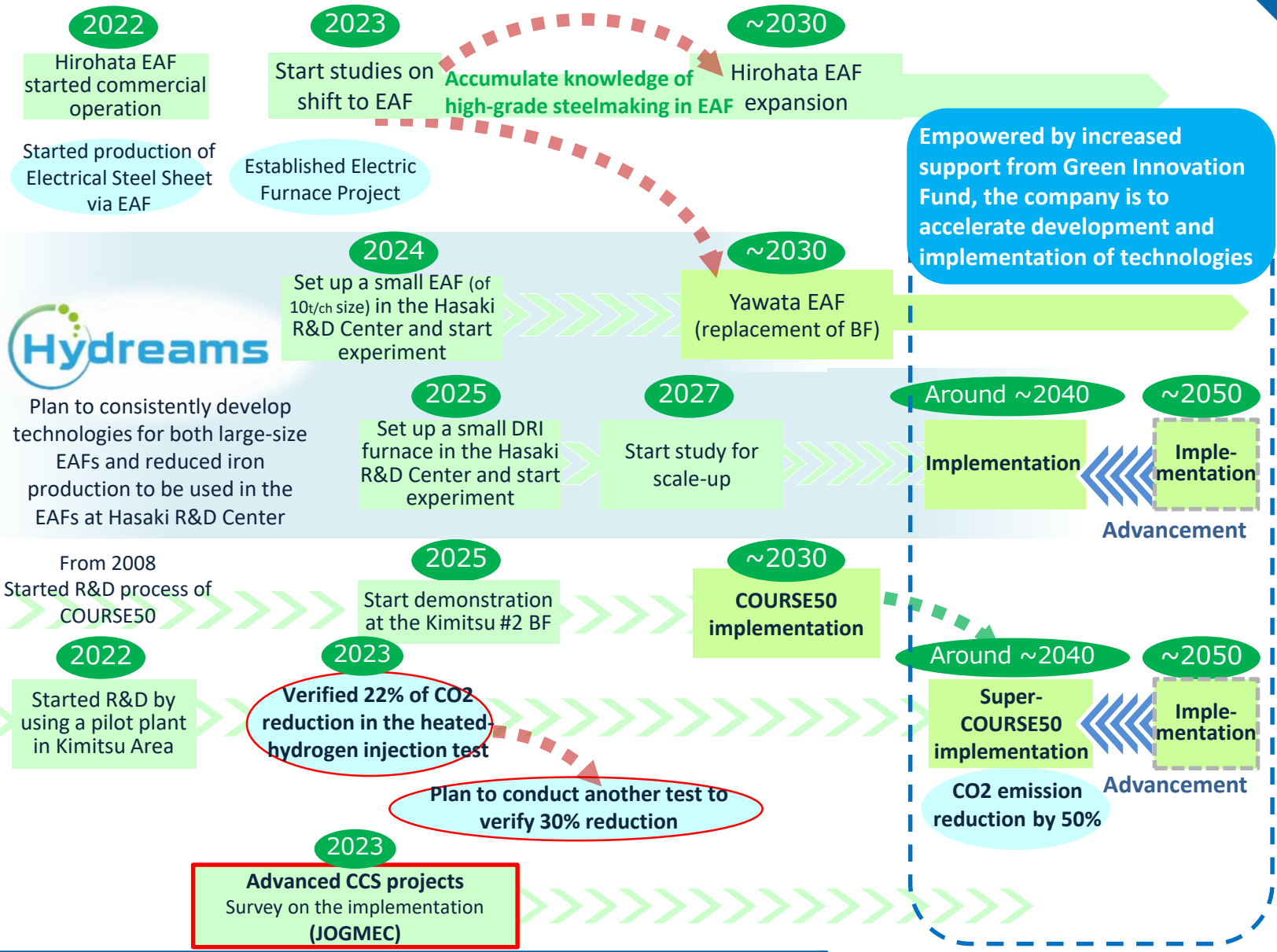
Carbon Neutral Vision 2050

High-grade steel production in large size EAF

Hydrogen direct reduction of iron

Hydrogen injection into BF

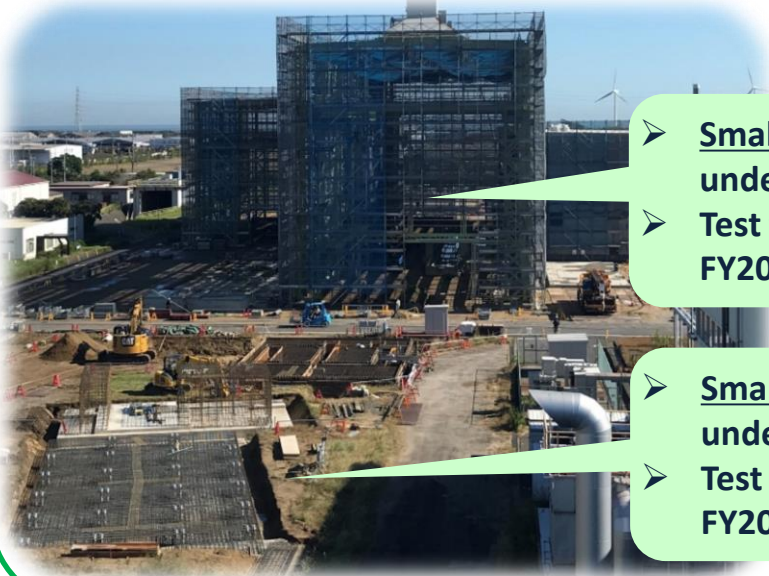
CCS



R&D base "Hydrearms," intended for the decarbonization technology development

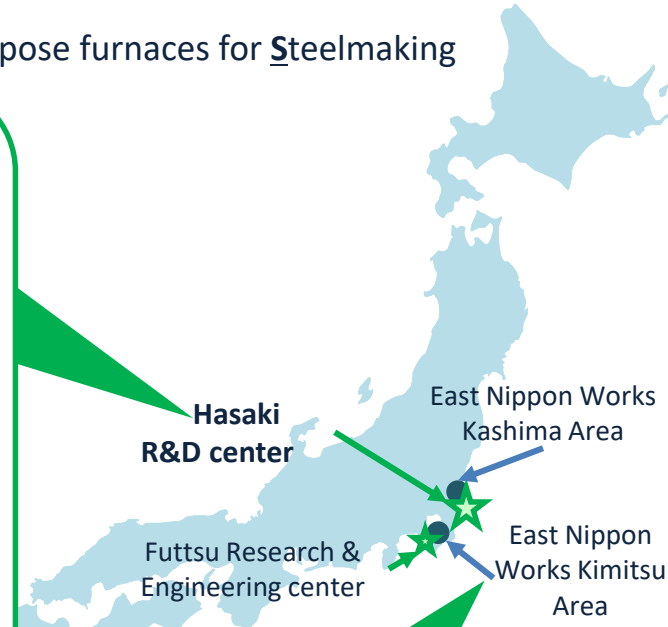
- Plan to consistently develop technologies for both high-grade steel production in large-size EAFs and reduced iron production to be used in the EAFs at Hasaki R&D Center
- The company plans to accelerate R&D processes for decarbonization technologies by designating a district at Hasaki as "Hydrearms™," where test shaft furnace and test EAF are to be placed

"Hydrearms" : Hydrogen Direct Reduced Ironmaking and Electric Arc Multi-purpose furnaces for Steelmaking



- Small-scale test EAF(10t/ch) under construction
- Test to be conducted from FY2024

- Small-scale test shaft furnace under construction
- Test to be conducted from FY2025



- ◆ Plant to demonstrate technology of in-house hydrogen injection into blast furnaces(COURSE50) on the #2 blast furnace in Kimitsu
- ◆ Conducting tests of technology external source hydrogen injection into blast furnaces(Super-COURSE50) on a 12m³ test furnace

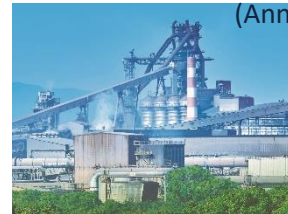
Hydrogen injection into BF Progress of Super COURSE50 Technology Development

Super COURSE50 development test in a small test furnace at Kimitsu area in East Nippon Works verified the world's highest level of CO2 emissions reduction effect of heated hydrogen injection at 22%.

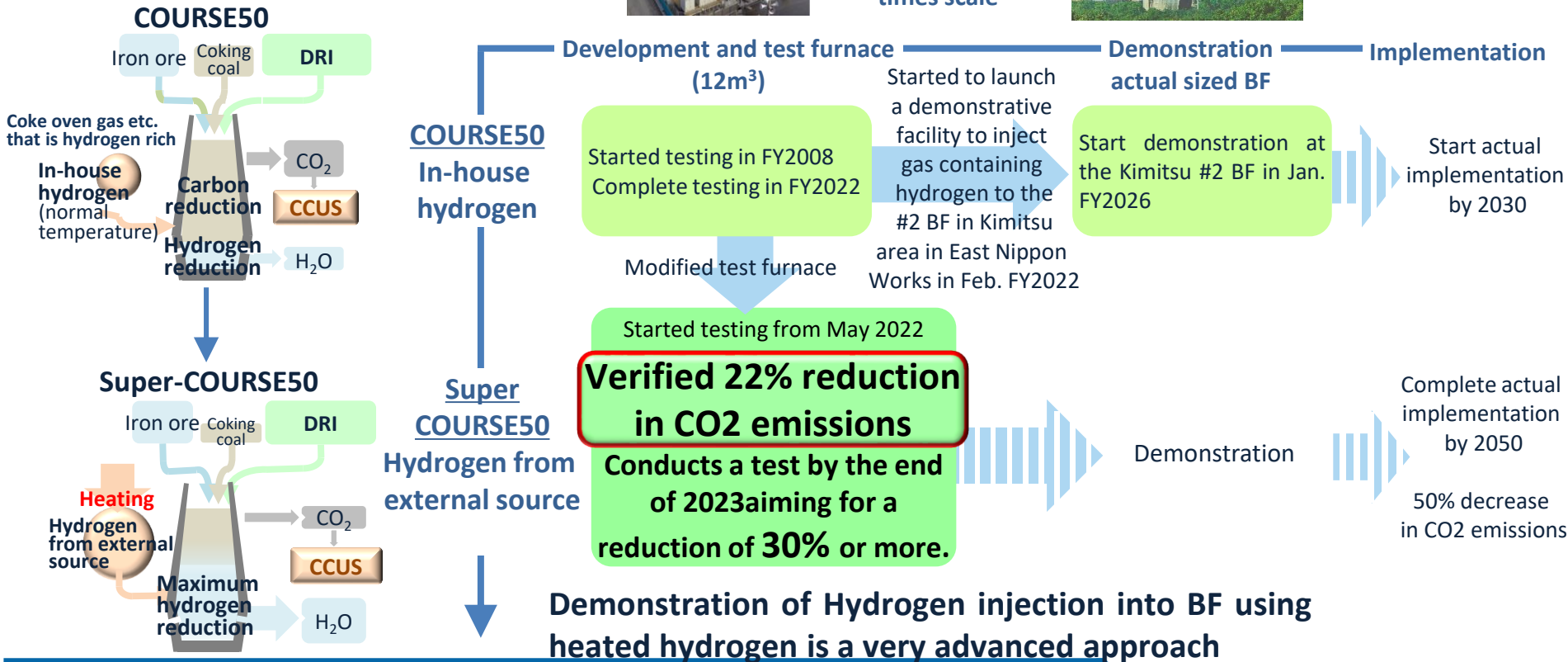
Work on early establishment of Super-COURSE50 technology (CO2 emissions reduction of 50% or more)



Approx. 400 times scale



(Announced on August 4, 2023)

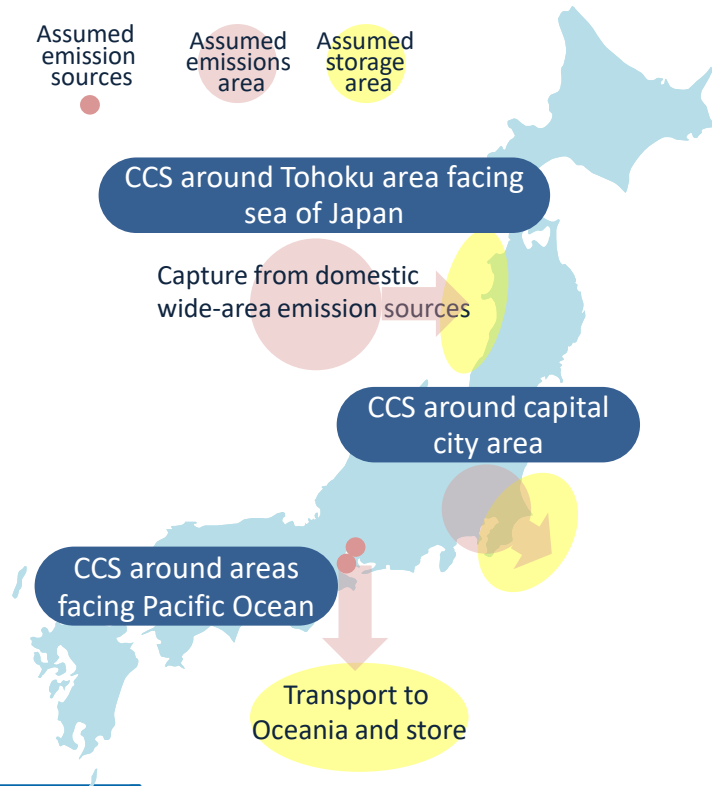


Participated in advanced CCS projects

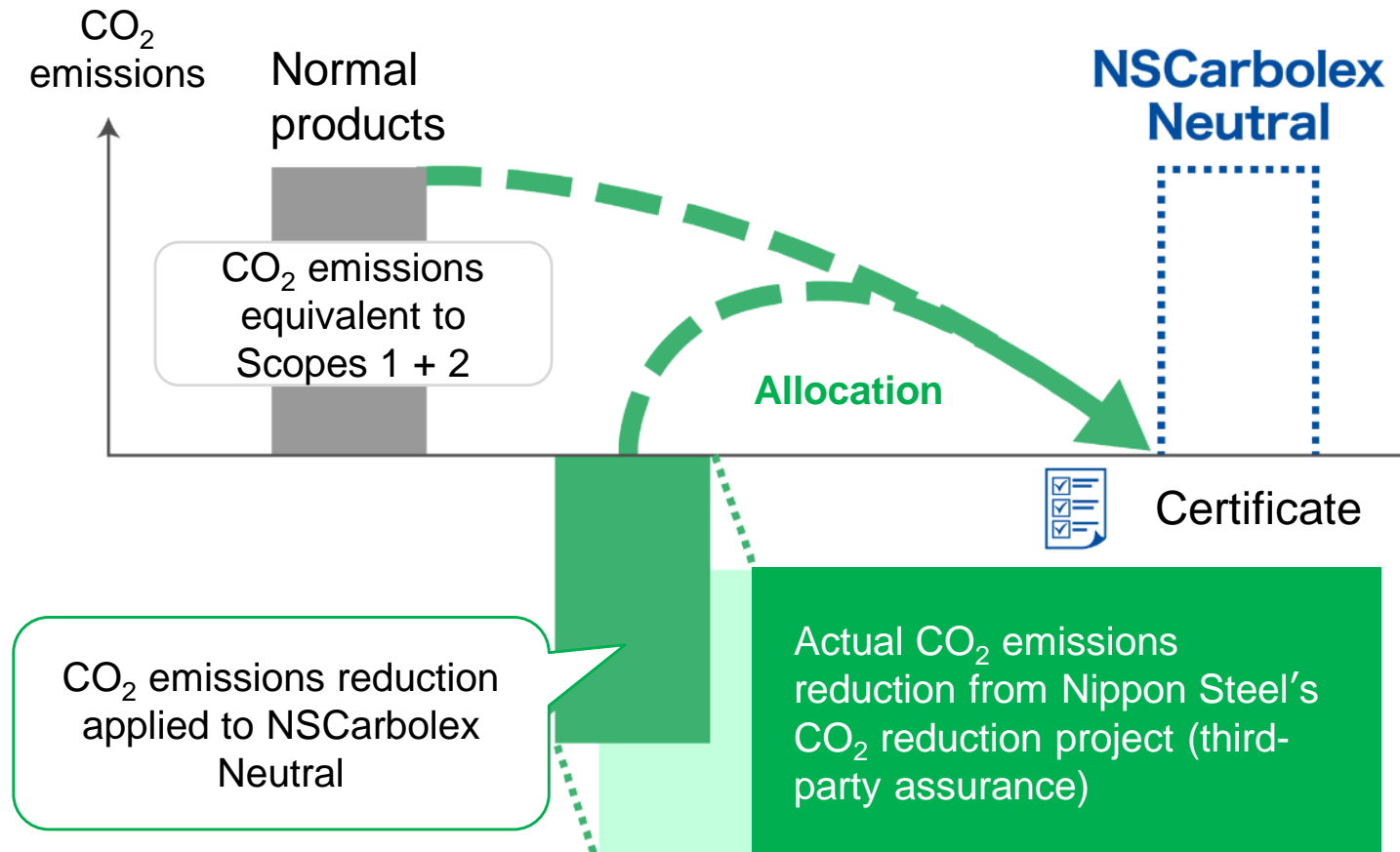
Participated in three leading joint projects coordinated by JOGMEC, “Survey on the Implementation of Advanced CCS Projects” (released Aug. 2nd and 3rd, 2023)

- Nippon Steel and other companies have been commissioned with other companies to conduct a feasibility study on the three advanced CCs project in 2023 coordinated by JOGMEC, Japan Organization for Metals and Energy Security
- Promote with each company the development of external conditions such as securing storage sites, development of storage infrastructure, and development of laws and regulations.
- Nippon Steel is proactively involved in studies related to CO₂ separation and capture, liquefaction, and shipping terminals, based on location restrictions of each steelworks.

	Storage Mt/Y	Company	Characteristics
CCS around Tohoku area facing sea of Japan	200	ITOCHU Corporation Nippon Steel Taiheiyō Cement Corporation Mitsubishi Heavy Industries, Ltd. ITOCHU Oil Exploration Co., Ltd. INPEX Corporation Taisei Corporation	<ul style="list-style-type: none"> ➤ Ship transportation of liquefied CO₂ ➤ Storage in the aquifer in the Tohoku region off the Sea of Japan
		Domestic	
CCS around capital city area	100	INPEX Corporation Nippon Steel Kanto Natural Gas Development Co., Ltd.	<ul style="list-style-type: none"> ➤ Transporting CO₂ through pipelines ➤ Storing the CO₂ in offshore coastal zones of the Tokyo metropolitan area
CCS around areas facing Pacific Ocean	200	Mitsubishi Corp. Nippon Steel ExxonMobil Asia Pacific Pte.Ltd.	<ul style="list-style-type: none"> ➤ Collect and liquefy CO₂ emissions from multiple industries in the Ise Bay/Chubu region ➤ Transport and storage to offshore depleted oil and gas field overseas
		Overseas	



Mass Balance Method is applied to NSCarbolex™ Neutral. Mass Balance Method is a method in which the total amount of CO₂ emissions that Nippon Steel has actually reduced by reforming and improving manufacturing processes, etc. is determined and allocated to any given steel product





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