Environmental Vision 2050

JFE Steel
Carbon Neutrality Strategy Briefing 2023

November 8, 2023
JFE Steel Corporation

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The Steel Sector is the Largest CO_2 Emitter

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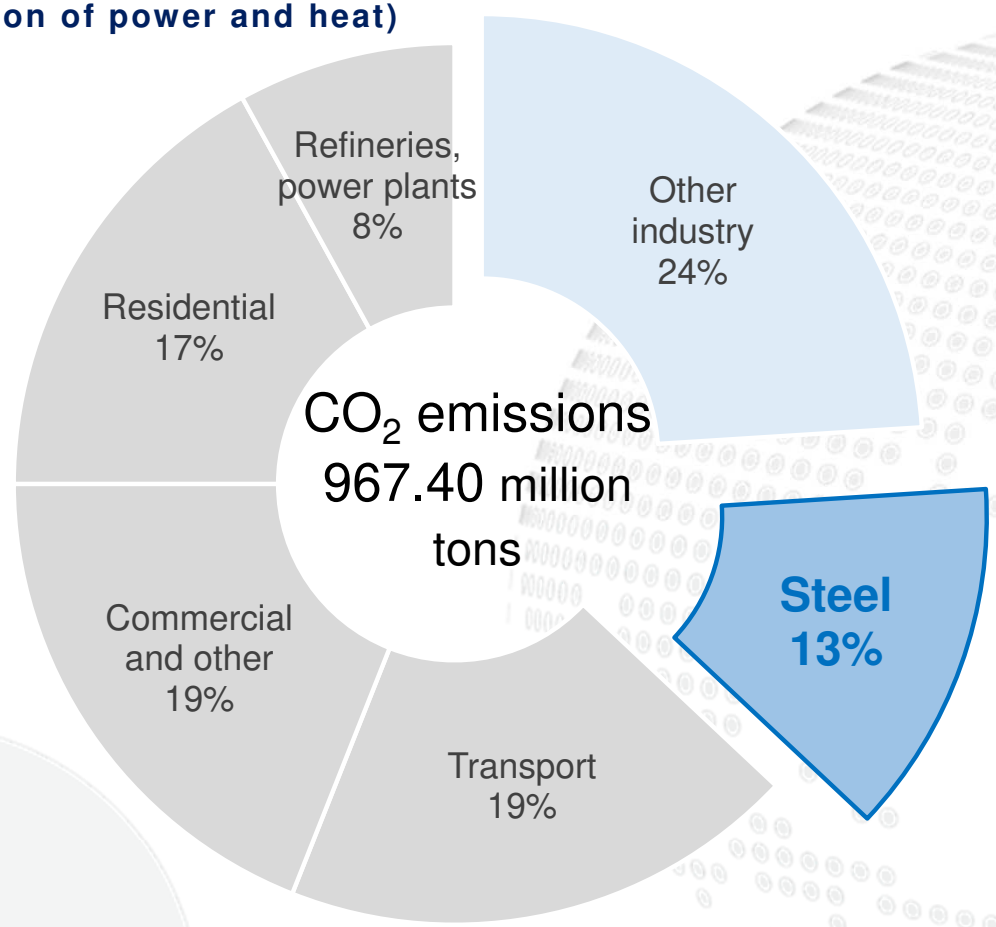
- The steel industry is a large CO_2 emitter, accounting for 13% of the national total in Japan, and is a key industry for achieving carbon neutrality nationwide.

■ **Energy-related CO_2 emissions in Japan (in 2020, after allocation of power and heat)**



Values after emissions associated with power generation by electricity businesses are allocated to end customers according to electricity consumption.
Machinery includes the manufacture of fabricated metal products. The manufacture of chemical and allied products includes petroleum and coal products.
Based on the Ministry of the Environment, Japan's National Greenhouse Gas Emissions Data (FY1990 to FY2020) (final figures).

Source: The Japan Iron and Steel Federation website. (in Japanese) (https://www.carbon-neutral-steel.com/about/)

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Milestones of Japanese Steel Industry

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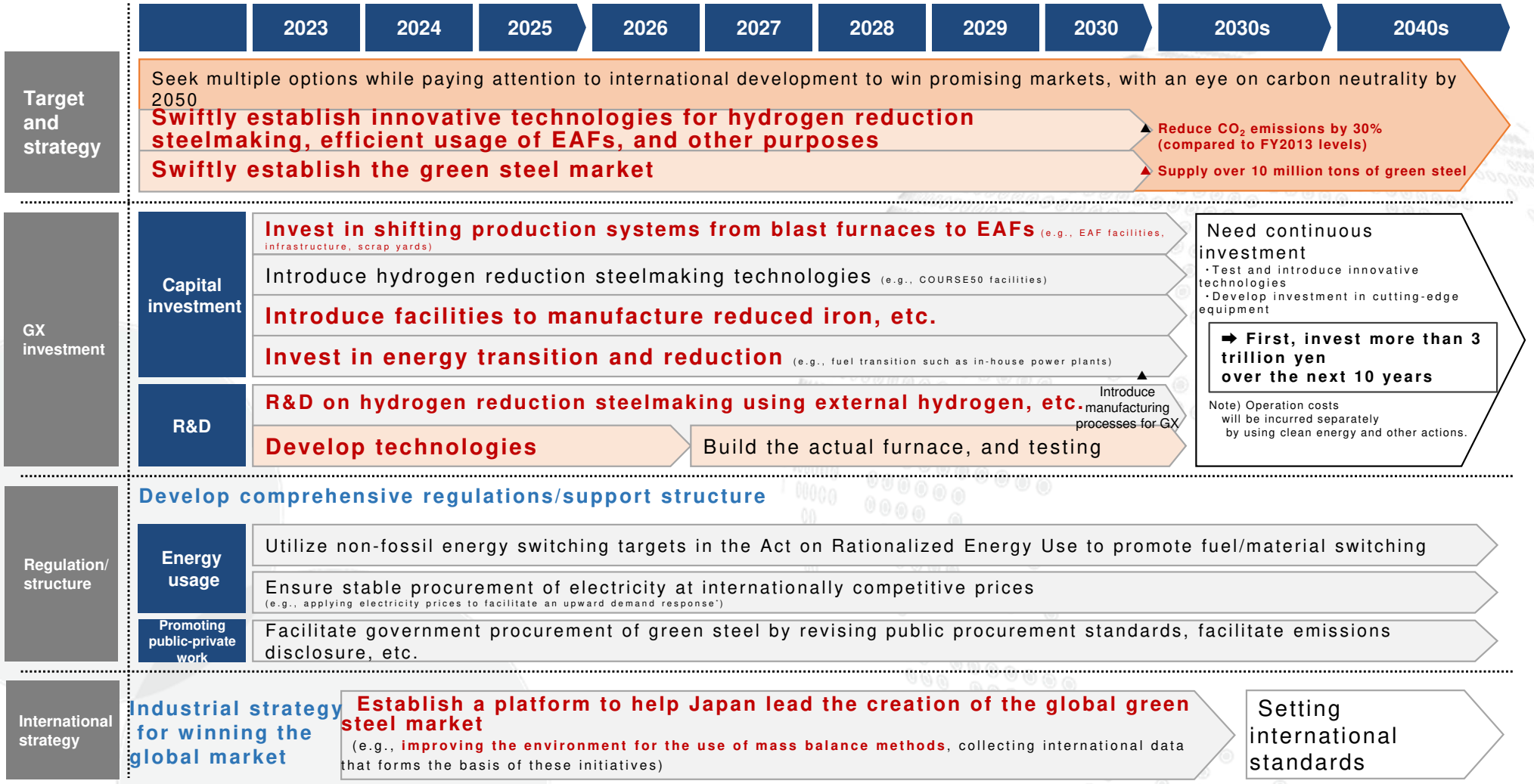
▶ Aiming for carbon neutrality by 2050, the industry strives to build a system to supply 10 million tons of green steel by 2030, as stated in the government's goals. To this end, it has been discussing investment in radical transition while assuming government support.



* Upward demand response: efficiently using excess renewable energy to increase demand

Source: The diagram is made based on the Basic Policy for the Realization of GX: Reference Document (METI, February 2023).
(https://www.meti.go.jp/press/2022/02/20230210002/20230210002.html)

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Projects Supported by the Green Innovation Fund

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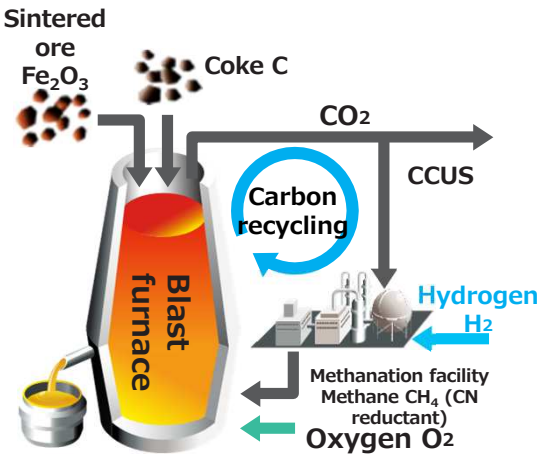
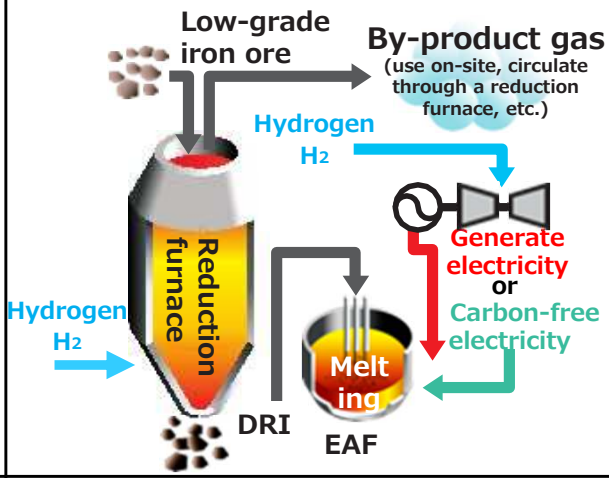
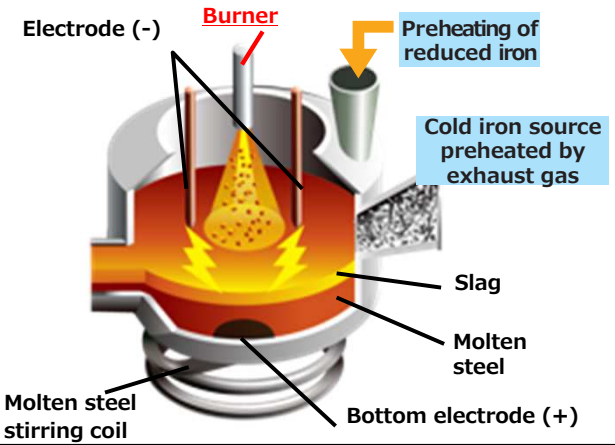
- Promoting the development of ultra-innovative technologies in the NEDO project on hydrogen utilization in iron and steelmaking processes, financed by the Green Innovation (GI) Fund.
- Started building a small test blast furnace (150m^3) in Chiba District, aiming for swift implementation.

	Ultra-innovative blast furnace (Carbon-recycling blast furnace)	Direct-reduction steelmaking	Large, high-efficiency EAF
Development project			
Target	Reduce CO_2 emissions by 50% or more (compared to conventional blast furnaces)	Reduce CO_2 emissions by 50% or more (compared to conventional blast furnaces)	Establish high-quality and high-efficiency melting technologies
Description	• Technology to inject a large amount of oxygen and methane • Developing technology for seamless operations between the blast furnace and the methanation facility	• Heat compensation for hydrogen reduction (injection of high-temperature hydrogen and recycled methane) • Optimizing conditions for injecting reduced gas according to the grade of the raw material	• Improving steel quality by facilitating the denitrification with hydrogen gas and dephosphorization with suppress reoxidation • High-efficiency melting through burner lance, preheating of reduced iron, and molten steel stirring
Period	Test scheduled for FY2025-2026	Test scheduled for FY2024-2026	Test scheduled for FY2024-2025

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Multitrack Approach to Technology for Carbon Neutrality

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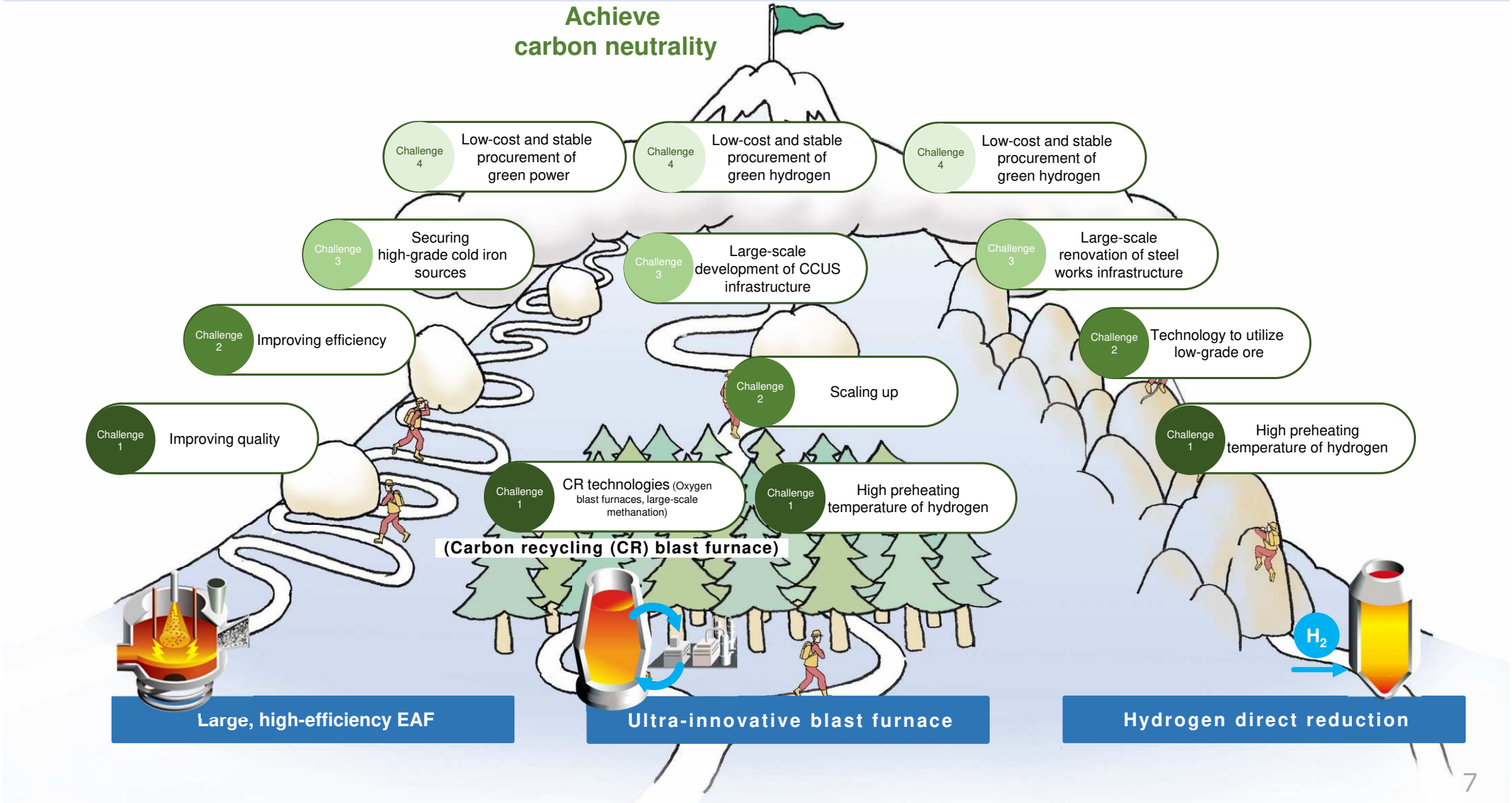
- A variety of technical paths and numerous challenges exist along the way to reaching carbon neutrality (summit) by 2050.
- Since the fastest way to the summit is yet to be found, a multitrack approach is essential in driving technological development.
- Moreover, government support and collaboration with society are critical, considering the difficulties in achieving the goal at an individual company level.



JFE Steel's Transition: Direction and Challenges

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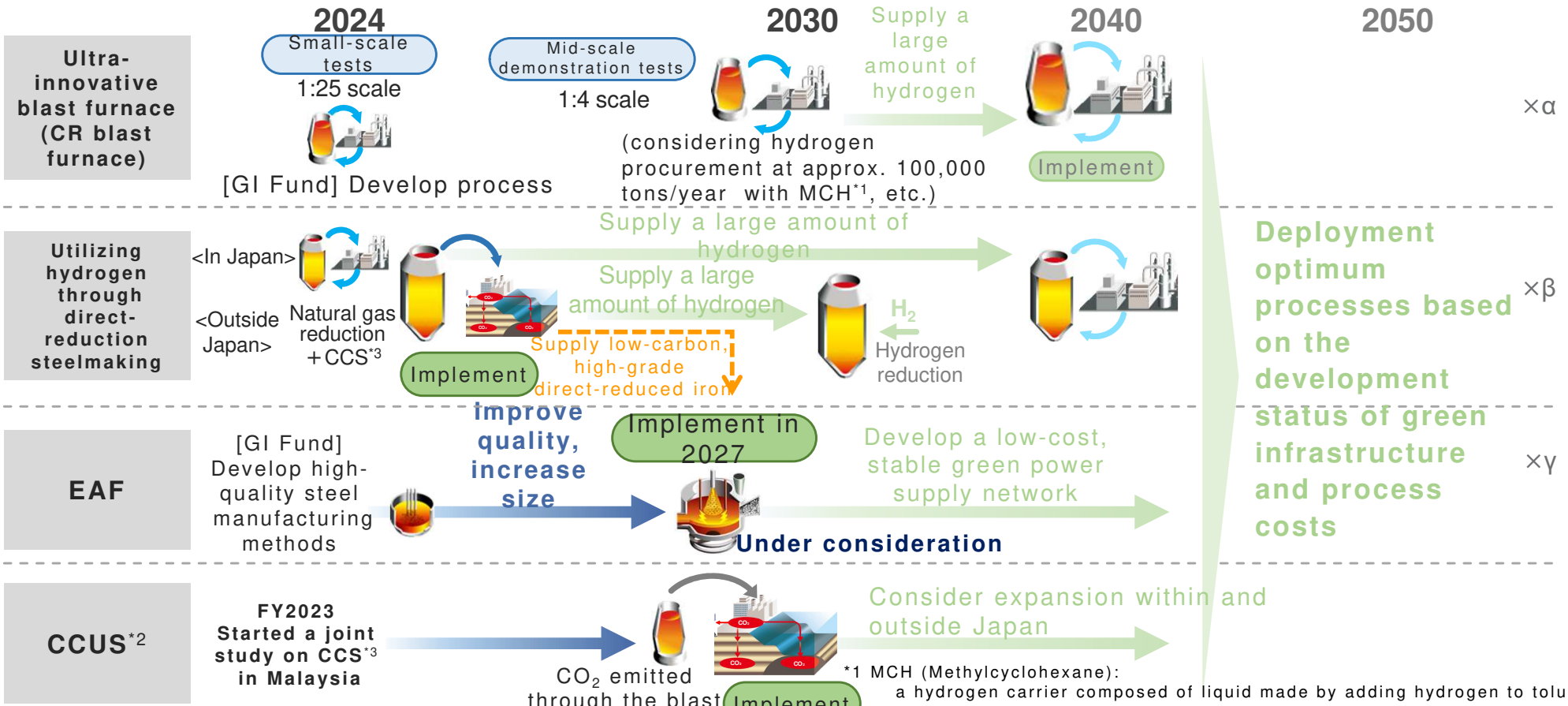
- Developing technologies to produce high-quality and high-functional steel in the GI Fund project by using technologies to utilize hydrogen in the blast furnace process and direct-reduction steelmaking as well as EAFs.
- **Considering the transition of one blast furnace, which is to be refurbished in 2027, to a large, high-efficiency EAF, assuming government support. Aiming for lower CO_2 emissions and business growth.**
- Policies on the transition after 2030 will be formulated later, taking account of issues such as the development of plentiful, low-cost, and stable supply networks of hydrogen and power as well as demand for green steel.



*1 MCH (Methylcyclohexane): a hydrogen carrier composed of liquid made by adding hydrogen to toluene

*2 CCUS: Carbon dioxide Capture, Utilization and Storage
*3 CCS : Carbon dioxide Capture and Storage

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Concept of 2027 Transition in Kurashiki

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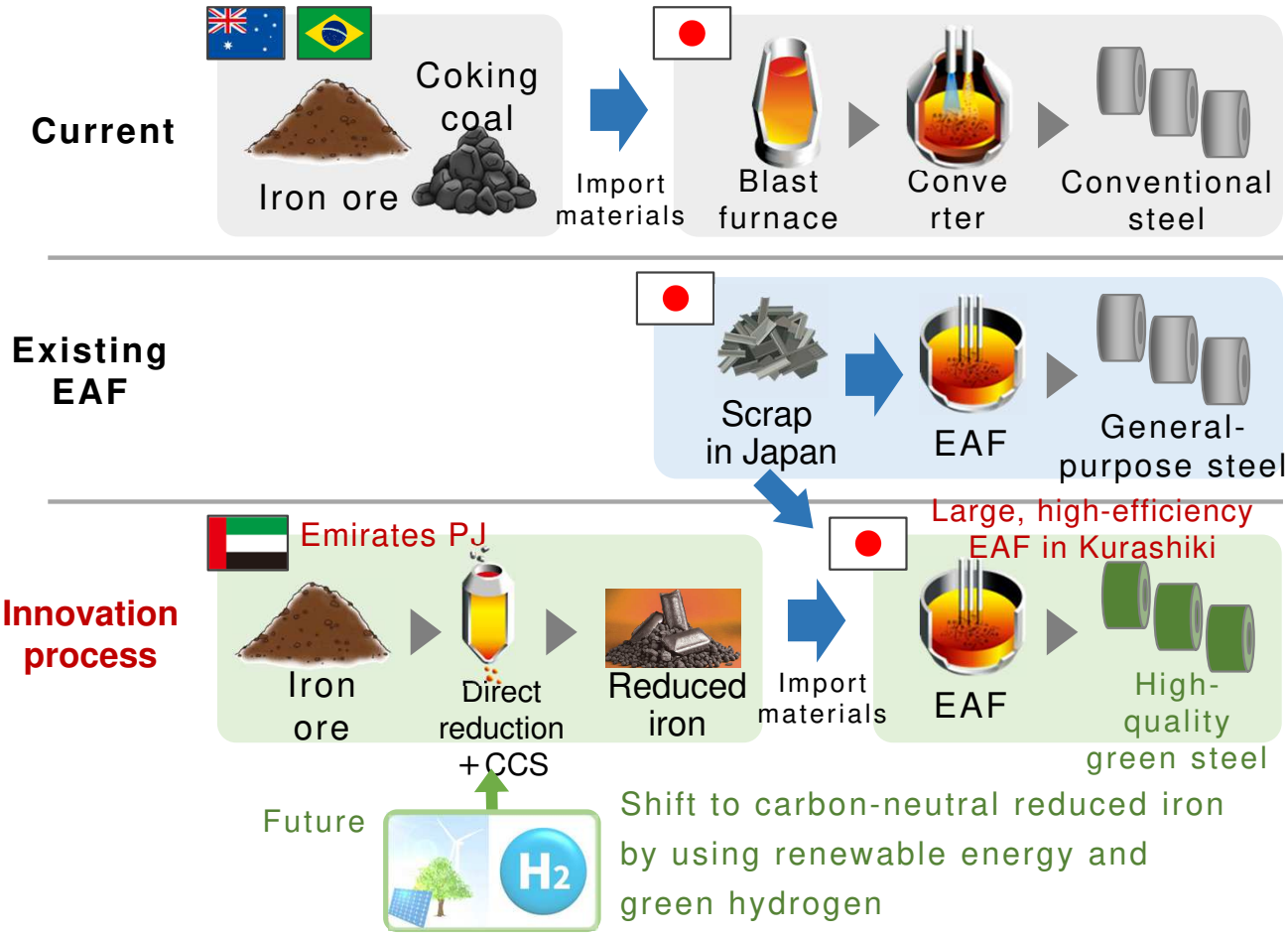
- Production efficiency and product quality are major challenges in the transition from blast furnaces to EAFs.
- Aiming for the large-scale supply of green, high-quality, and high-functional steel by overcoming challenges in the large-scale high-efficiency EAF (innovative EAF) under consideration.
- Direct-reduction iron is essential in producing high-quality steel in EAFs. Planning to procure iron sources from the Middle East, which is a suitable location for solar power generation, CCS, and green hydrogen production.



Production efficiency	Product quality	CO_2 emissions
High	High	Large
Low	Low	Small
Low → **High***1	Low → **High***1	**Small***2 → **Zero***3

*1 Improved through JFE Steel's technological development

*2 Natural gas reduction + CCS

*3 Green hydrogen reduction + renewable energy

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Large, High-efficiency EAF in Kurashiki: Investment Overview

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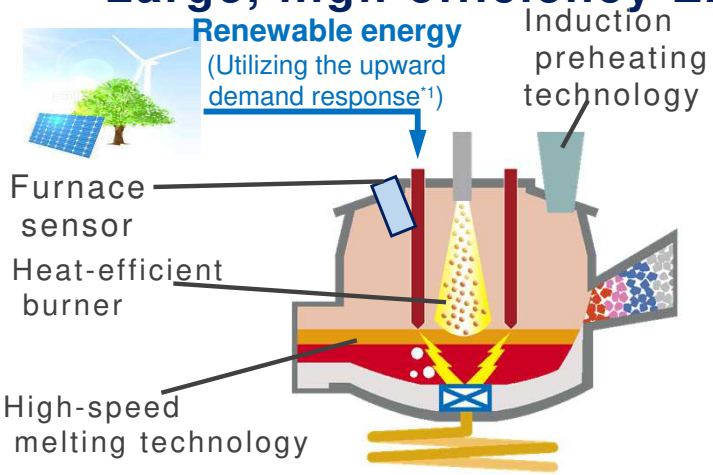
- The Kurashiki EAF applies innovative technologies being developed in the GI Fund project such as high-quality and high-efficiency melting technology, as well as technology uniquely developed by JFE Steel.
- By introducing these technologies and utilizing Green Ferrous Material, the company will be the first to build a large-scale supply system for green, high-quality and high-functional steel comparable to that produced through the blast furnace process, which has been extremely difficult to achieve in existing large EAFs.

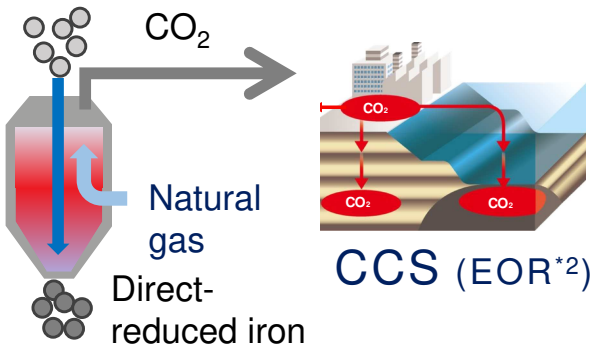
■ Large, high-efficiency EAF



Expected time to start operations	FY2027
Annual production	Approx. 2 million tons/year
Reduced iron to be used	Up to 50%
CO_2 reduction	Approx. 2.6 million tons/year

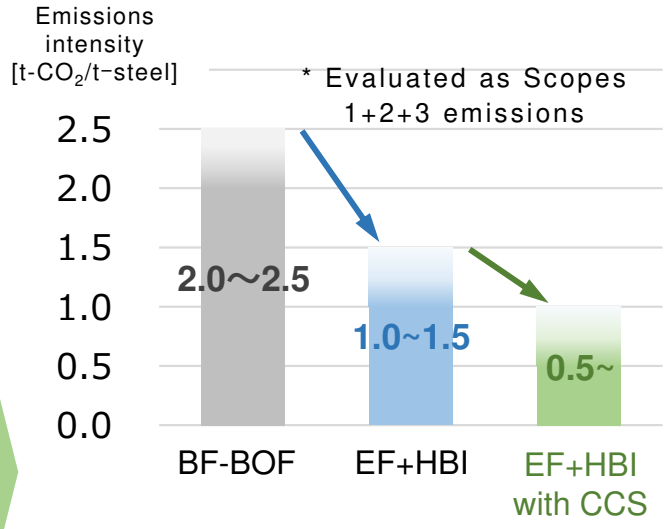
*1 Upward demand response: efficiently using excess renewable energy to increase demand

■ UAE project on direct-reduced iron



*2 Enhanced Oil Recovery

Expected time to start operations	Second half of FY2025 or later
Annual production	2.5 million tons/year
Reduction method	Natural gas (+ CCS) → Using hydrogen in the future



(BF: blast furnace; BOF: converter; EF: electric furnace; HBI: reduced iron)

Ultra-innovative EAF + Green Ferrous Material

Produce green, high-quality steel comparable to that produced through the blast furnace process

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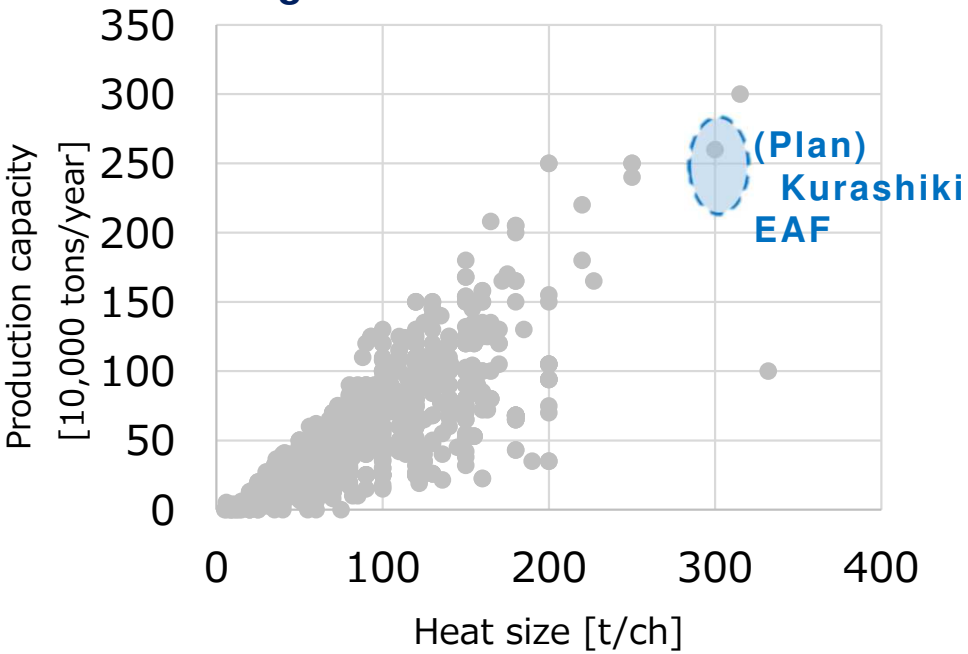
Large, High-efficiency EAF in Kurashiki: Innovation

- Achieving production efficiency comparable to that of the blast furnace process by introducing one of the largest EAFs in the world and applying high-efficiency melting technology currently being developed.
- Also aiming to produce high-quality and high-functional steel that has been impossible for existing EAFs to produce, such as electrical steel sheets and high tensile steel sheets, not only through JFE Steel's accumulated refining technology but also through the development of quality-improving technology using the GI Fund.

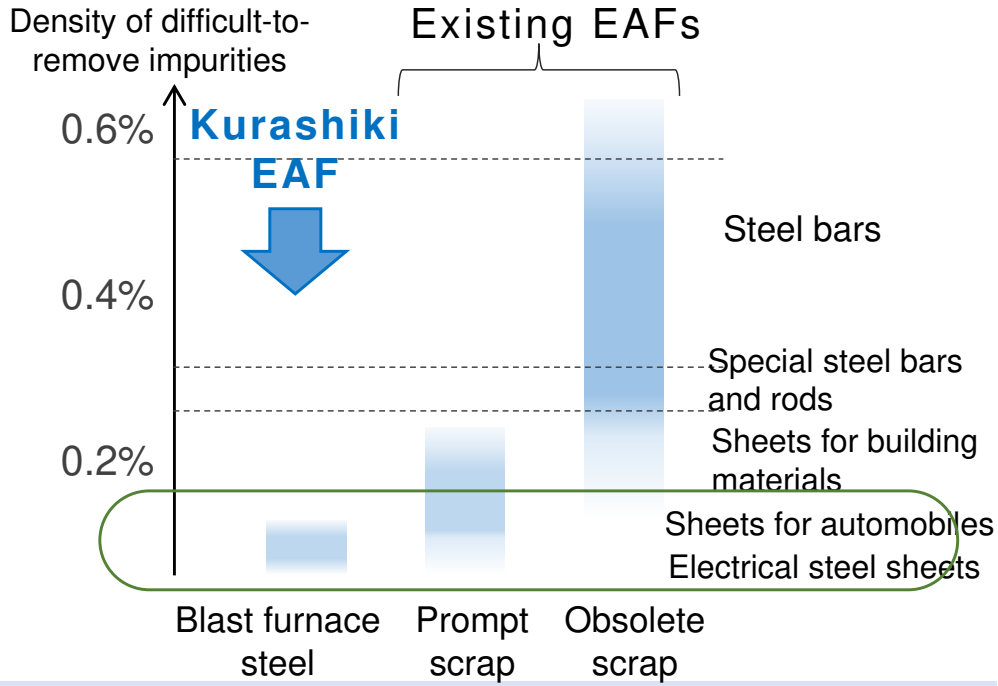
■ Improving efficiency and increasing size



Establish high-efficiency melting technology through innovative processes, including heat-efficient burners, molten steel stirring coils, and induction preheating.

Source: German Steel Association's database on world steel companies (2018 edition), edited by JFE Steel.

■ Improving quality



Establish technologies to reduce the impact of impurities contained in scrap (tramp elements) and to achieve levels of phosphorus and nitrogen comparable to the blast furnace process.

Source: Jones, A.J.T., Assessment of the Impact of Rising Levels of Residuals in Scrap, Proceedings of the Iron & Steel Technology Conference (2019), edited by JFE Steel.

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Progress on the Emirates Project

- An agreement was signed on July 17, 2023, stating that Abu Dhabi Ports Group (ADPG) will participate fully in project*-related port development and operations, land leasing and services, and infrastructure development.
- Collaboration with ADPG will provide the undertaking with access to a suitable site for building a distribution & logistics system capable of stably importing raw materials and shipping products for the envisioned supply chain of Green Ferrous Material.

*On September 1, 2022, JFE Steel signed an agreement with Itochu Corporation and Emirates Steel Arkan to jointly conduct detailed feasibility studies on the establishment of a supply chain for the Ferrous Raw Material for Green Ironmaking with Low-carbon Emissions (Green Ferrous Material) at the project site in Abu Dhabi.

On July 17, 2023
MOU exchange ceremony held during the Japan-UAE Business Forum in Abu Dhabi, UAE, in the presence of Prime Minister Fumio Kishida

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Progress on the CO_2 Emissions Reduction Plan

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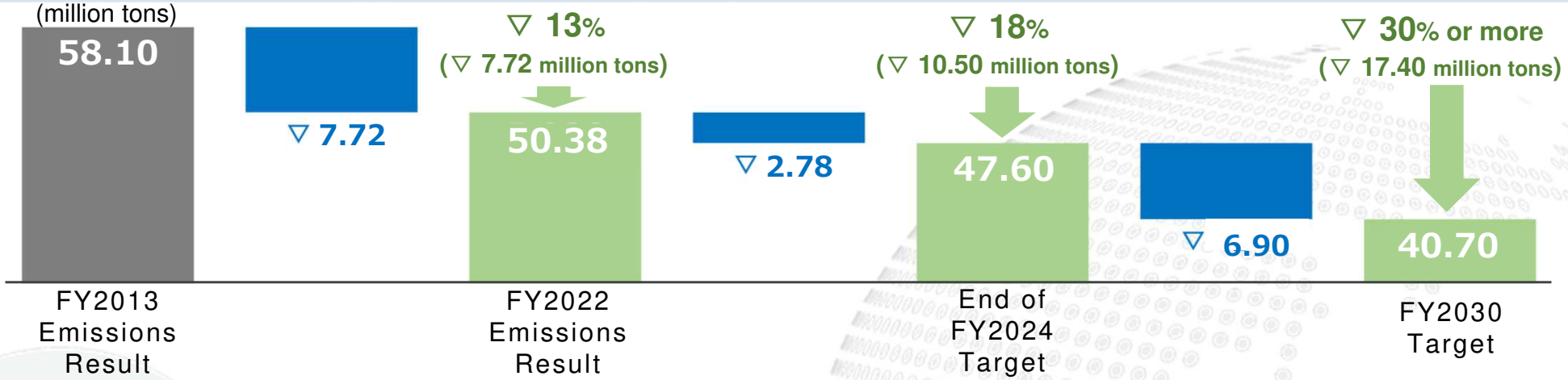
- Moving forward according to the FY2022 plan, achieving a 13% reduction. Also expecting to achieve the FY2024 year end target.
- Making solid progress in investment approval and implementation to achieve the reduction targets. Already approved for approx. 110 billion yen by FY2022.



Aiming for 18% reduction by the end of FY2024

(KPI progress up to FY2022)

■ Capital investment

Completed approval for 90% of total CO_2 reduction in the investment plan against the CO_2 reduction target* through energy savings and technological development

→ Completed approval for 88% of the total investment plan

■ Emissions reduction

Achieve 50% of the CO_2 reduction target* through energy savings and technological development

→ Achieved 58% of the CO_2 reduction target

*CO_2 reduction through energy savings and technological development: 3.00 million tons

Aiming for 30% or more reduction by FY2030

Energy savings and high efficiency

- Upgrade to high-efficiency coke ovens in Fukuyama (▽ 16)
- Improve efficiency of power demand facilities
- Leverage AI & DS

Low-carbon feedstock & fuel

- Expand the use of scrap in converters (▽ 150)
- Use reduced iron in blast furnaces and converters (▽ 200)

Utilizing EAFs

- Sendai: Upgrade existing EAFs (▽ 10)
- Chiba: Introduce EAFs for SUS (▽ 45)
- Kurashiki: Large, high-efficiency EAFs (▽ 260)

* The projects in blue bold font are already approved. Numbers in parentheses indicate the amount of reduction (10,000 tons/year).

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02 Carbon Neutrality Plan (Innovation Period)

- JFE Steel's Transition: Direction and Challenges
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JFE Steel's Transition: Direction and Challenges

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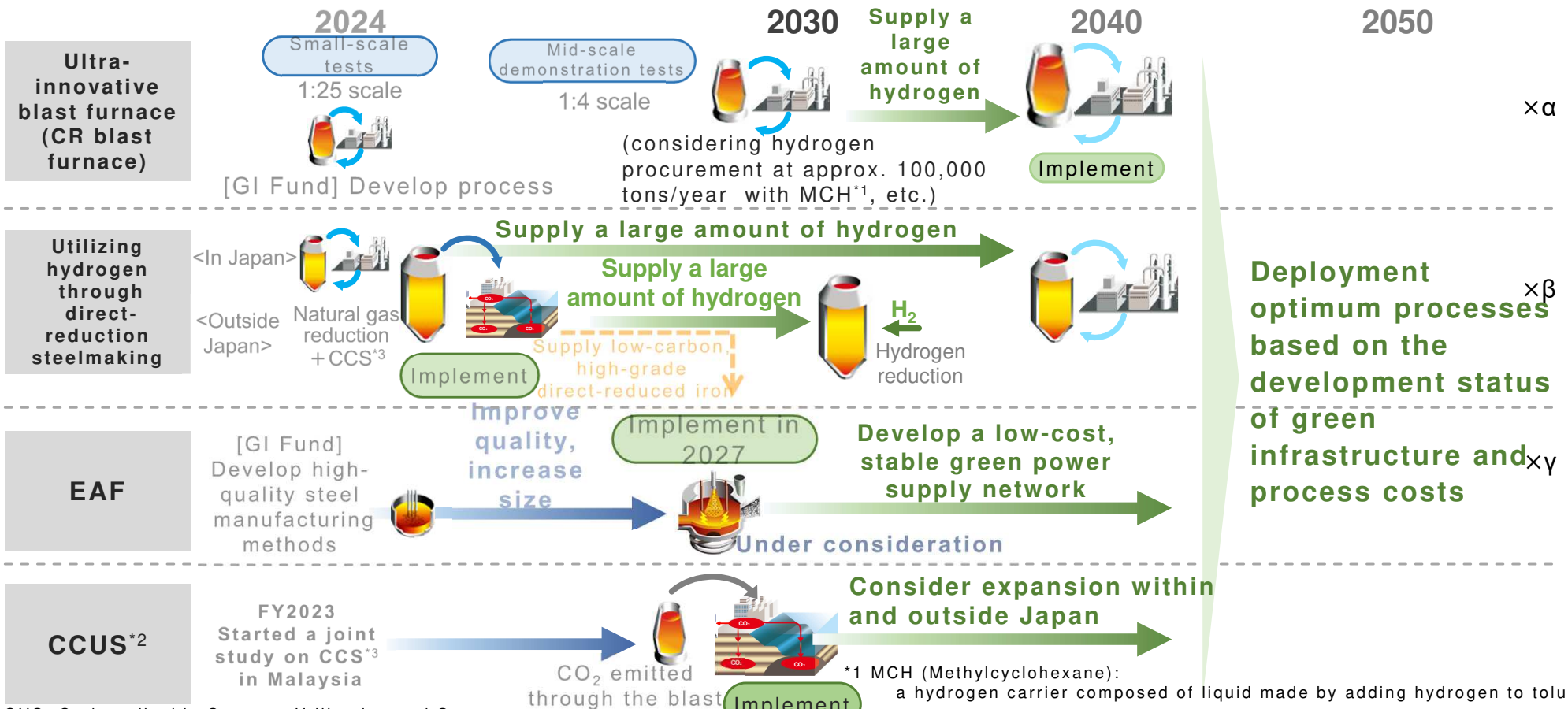

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*2 CCUS: Carbon dioxide Capture, Utilization and Storage
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Necessity of Developing an Ultra-innovative Blast Furnace Process (1)

- The blast furnace process is an extremely efficient ecosystem, effectively using all the by-product gas (energy) generated in the production process to heat steel and generate power.
- Transitioning all processes, for example to direct-reduction steelmaking, will require the complete renewal of facilities for upstream processes, which account for approximately 50% of steel works, while also reducing the generation of by-product gas, making it difficult to rebuild an efficient ecosystem.
- In order to utilize existing business resources, technological development of the ultra-innovative blast furnace process is also an important approach, aiming to reduce emissions to the extent possible.

* The numbers in the diagram indicate the CO_2 emissions intensity (t- CO_2 /t) in each process.

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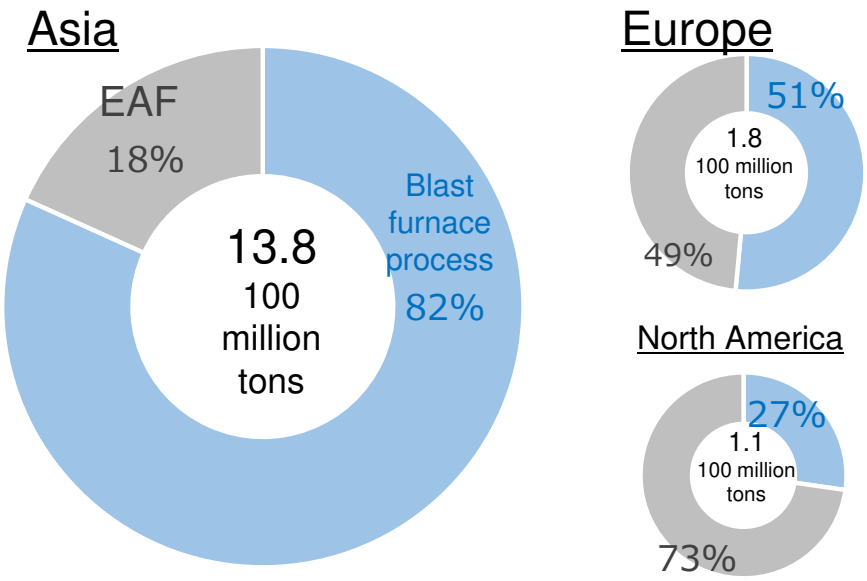
Necessity of Developing an Ultra-innovative Blast Furnace Process (2)

- Of the 1.9 billion tons of crude steel produced around the world, approximately 72% is supplied through the blast furnace process, mainly in Asia.
- Steel demand is expected to continue growing along with economic growth and population growth, and scrap alone will not be sufficient to meet the demand.
- In order to fulfill the responsibility to supply a large amount of high-quality and high-functional steel, it is important to utilize existing business resources and maintain the ultra-innovative blast furnace process, aiming to reduce emissions to the extent possible.

■ Crude steel production by process

✓ Development of ultra-innovative blast furnace technology can also make a significant contribution to reducing emissions in Asia, where blast furnaces dominate.

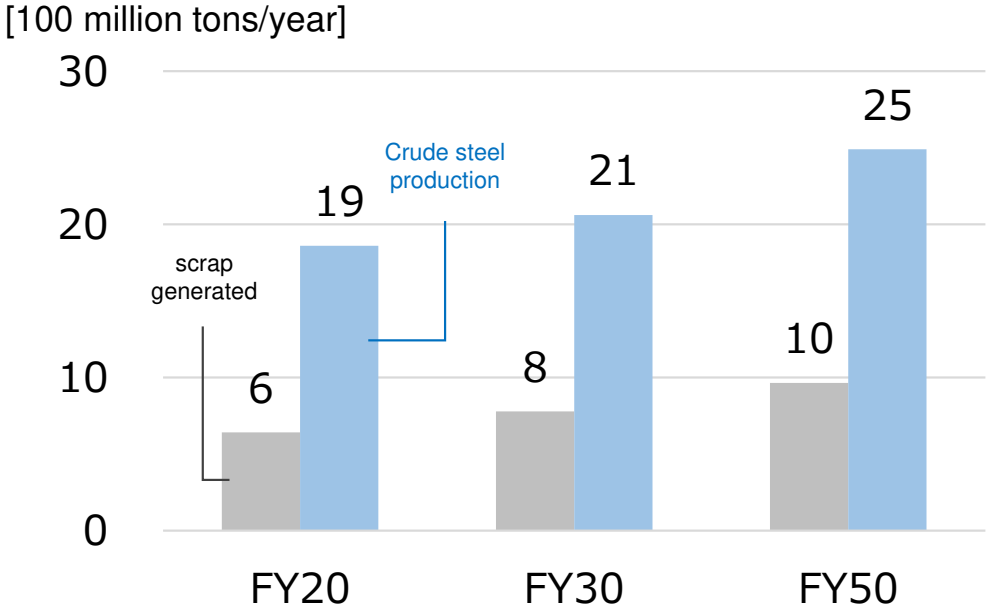


Source: Data in 2023 World Steel Figures, edited by JFE Steel.

■ Projected global crude steel production and scrap generated

✓ The amount of scrap generated is approximately 1/3 of crude steel production.

✓ Crude steel production from iron ore will be necessary in the future as well.



Source: Global Trends in Demand for Steel Scrap (2021, The Japan Ferrous Raw Materials Association) and Iron and Steel Technology Roadmap (2020;IEA), edited by JFE Steel.

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Necessity and Initiatives of CCUS

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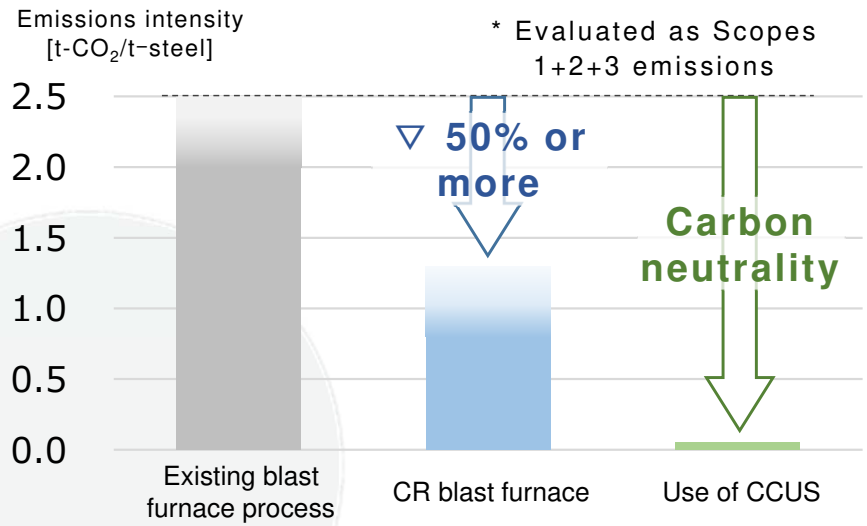
- Carbon-recycling blast furnaces aim to reduce CO_2 by 50% or more, and achieving carbon neutrality requires the use of CCUS*.
- Started joint evaluation on the establishment of a CCS value chain originated from Japan, aligned with the CCS study in Malaysia
- Accelerating discussions aiming to expand inter-company collaboration within and outside Japan, in addition to this project

■ Necessity of CCUS in the Japanese steel industry

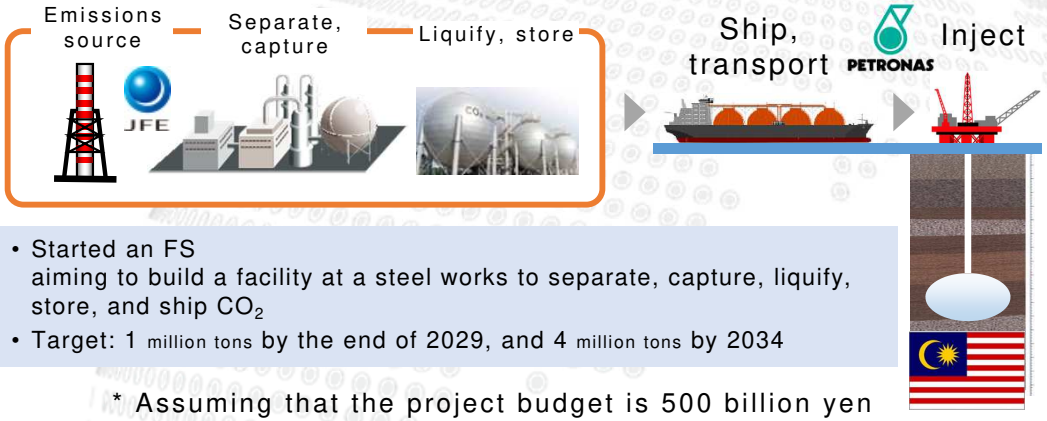


Despite efforts to implement ultra-innovative technologies and transition to carbon-neutral energy, it is still difficult to completely eliminate CO_2 emissions from manufacturing processes.

May need up to 20 million tons of CCUS

■ Initiatives to operationalize CC

JAPEX JGC K LINE



- Started an FS aiming to build a facility at a steel works to separate, capture, liquify, store, and ship CO_2
- Target: 1 million tons by the end of 2029, and 4 million tons by 2034

* Assuming that the project budget is 500 billion yen

■ Initiatives to expand inter-company collaboration

Studying possible collaboration among emitting companies

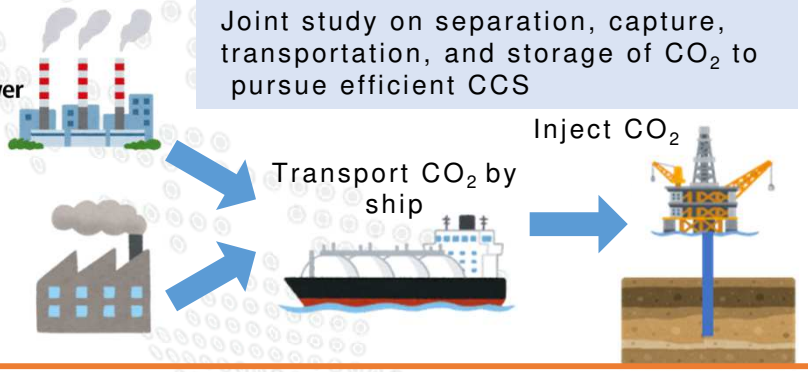
Thermal power plant

Kansai Electric Power — power with heart

Steel works

JFE

Joint study on separation, capture, transportation, and storage of CO_2 to pursue efficient CCS



* CCUS : Carbon dioxide Capture, Utilization and Storage

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Initiatives for Hydrogen Procurement

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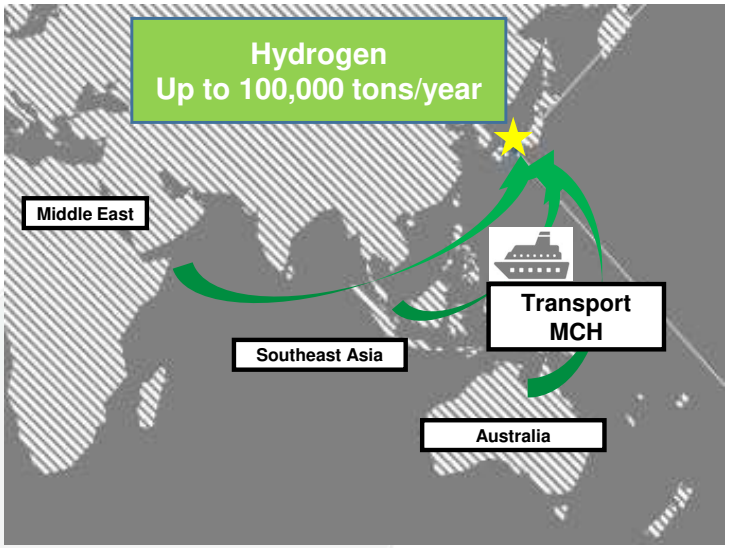
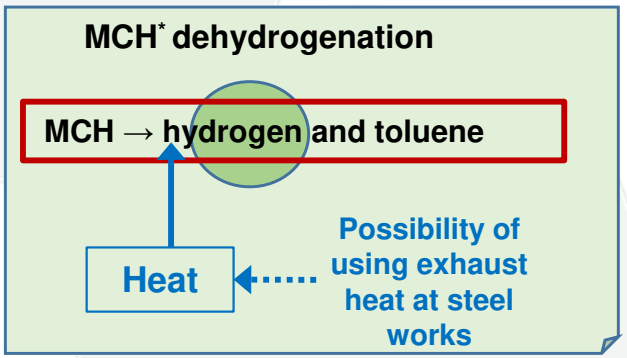
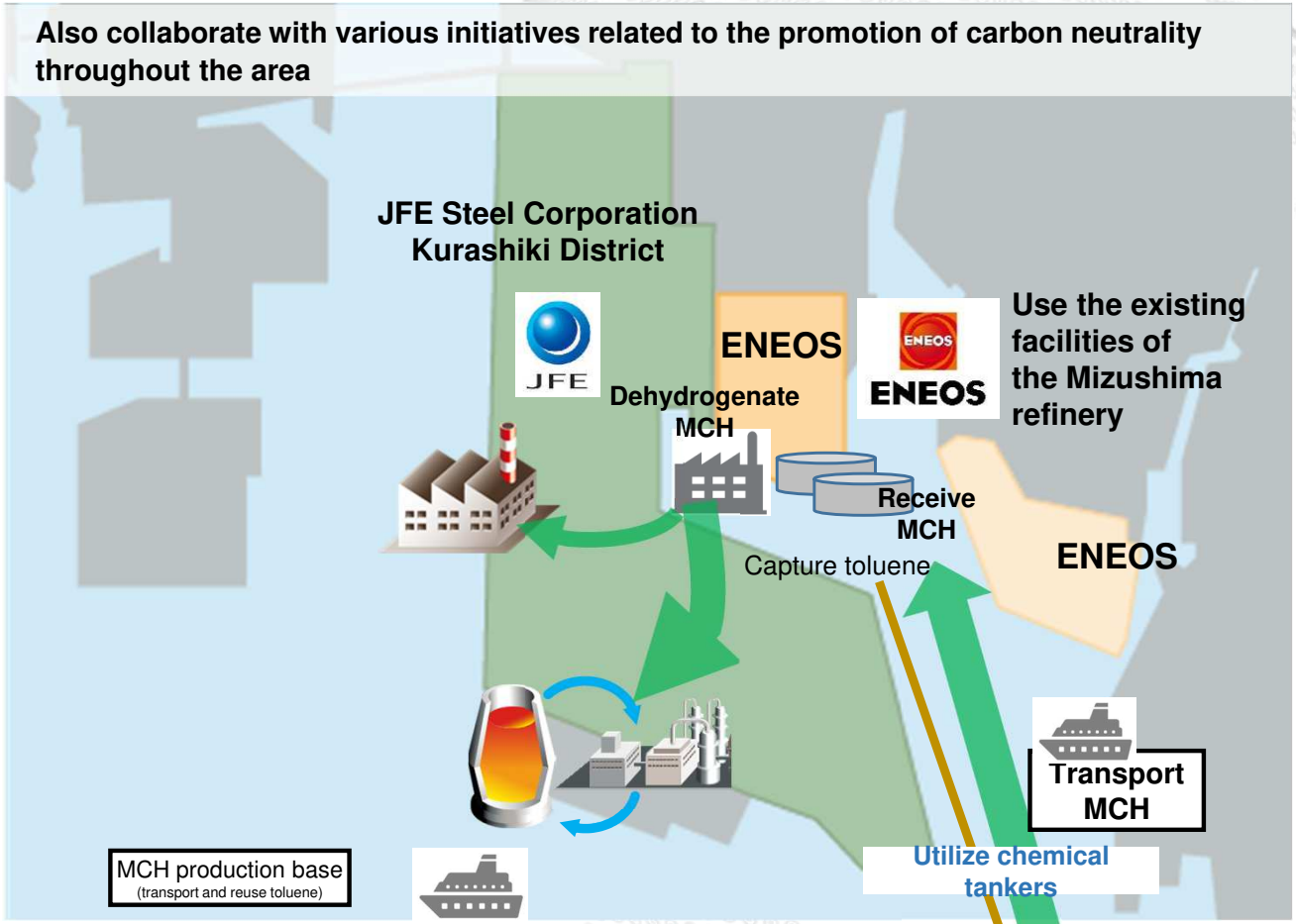
- Taking advantage of the location of the Mizushima Complex, West Japan Works (Kurashiki District) and ENEOS Corporation, which is situated adjacent, have started a joint study on hydrogen utilization, aiming to build a hydrogen supply chain by 2030. (up to approx. 100,000 t-H_2/year)
- Using for a mid-scale CR blast furnace demonstration and for fuel decarbonization.

■ Hydrogen procurement (ENEOS Corporation)





■ Hydrogen utilization at the Mizushima Complex



* MCH (Methylcyclohexane): a hydrogen carrier composed of liquid made by adding hydrogen to toluene

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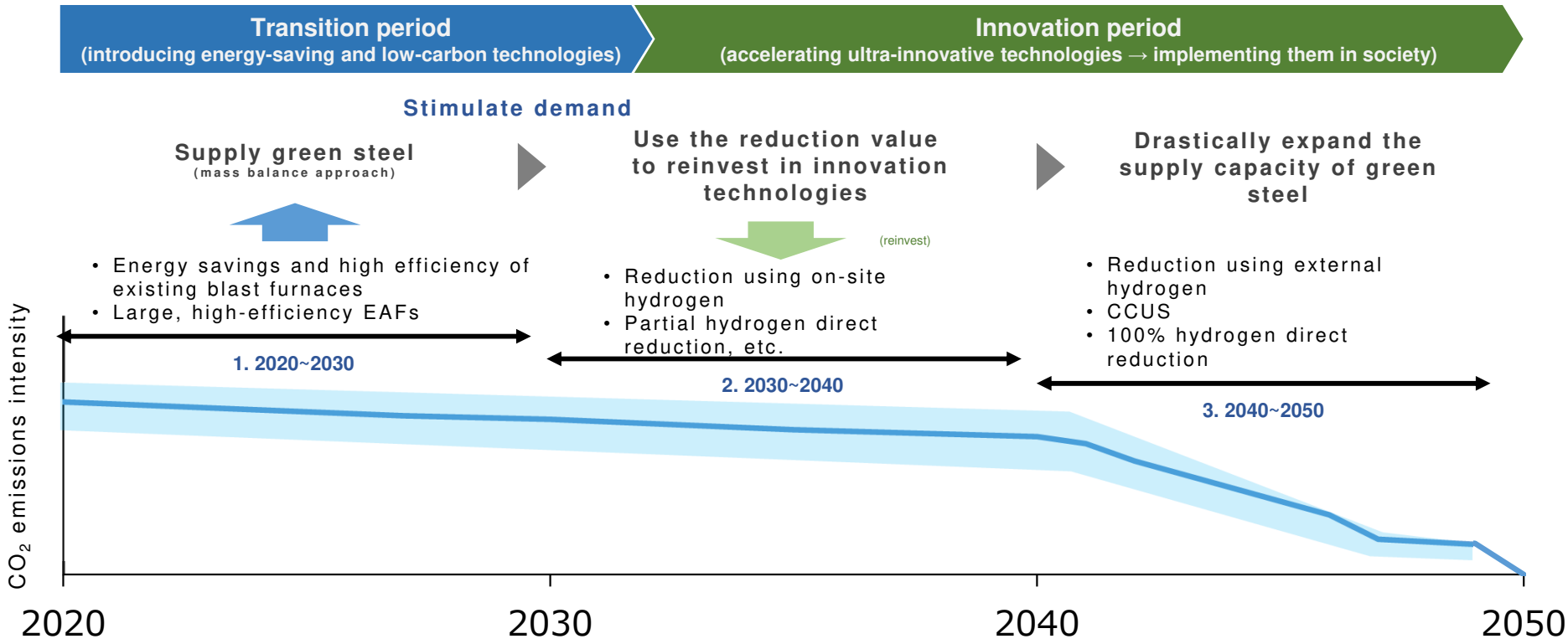
Necessity of Green Steel During the Transition Period

- It takes time and money to establish ultra-innovative steel processing technologies aiming for zero emissions as well as to develop social infrastructure such as green hydrogen and power. Meanwhile, the steel industry, as the largest emitter, needs to continue making the utmost efforts to reduce emissions.
- Proper evaluation needs to be conducted on the (environmental) value of the actual emissions reduction using energy-saving and low-carbon technologies during the transition period.
- In order to meet demand for green steel in the transition period, it is essential that the mass balance approach is applied, allocating CO_2 emissions reduction to any steel products.

■ Reducing the CO_2 emissions intensity of steel products: image



Source: The diagram was created based on the Technology Roadmap for "Transition Finance" in the Iron and Steel Sector (METI, October 2021).
(https://www.meti.go.jp/policy/energy_environment/global_warming/transition/transition_finance_technology_roadmap_iron_and_steel_jpn.pdf)

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Strategy to Stimulate Demand for Green Steel

Environmental Vision 2050

▶ Actively implementing activities for standardization and development of business models in order to stimulate demand for green steel.

■ Initiatives for setting international standards

- ✓ Proposal at Worldsteel
  Effectiveness and necessity of setting international standards for emissions calculation methods and adopting the mass balance approach (April and October 2023)
- ✓ Agreement at the G7 Ministers' Meeting on Climate, Energy and Environment
  Started working on implementation of the new Global Data Collection Framework related to the GHG emissions of steel products (April 2023)

■ Initiatives for formulating industrial rules

- ✓ Collaboration between the JISF and three blast furnace companies
  Formulated green steel guidelines applying the mass balance approach (September 2022)
  Formulated detailed green steel guidelines aiming to promote the mass balance approach (October 2023)
- ✓ Participation in the GX League
  Publishing recommendations on adding value to green products (scheduled for November 2023)

■ Initiatives as an individual company

- ✓ Starting supply of JGreeX™
  Started supplying green steel, applying the mass balance approach (September 2023)
- ✓ Development of a model to share CO_2-reduction costs throughout society
  Became the first in the world to develop a model to broadly share CO_2-reduction costs across the supply chain (June 2023)

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Contributing to CO_2 Reduction Through Green Steel JGreeX™

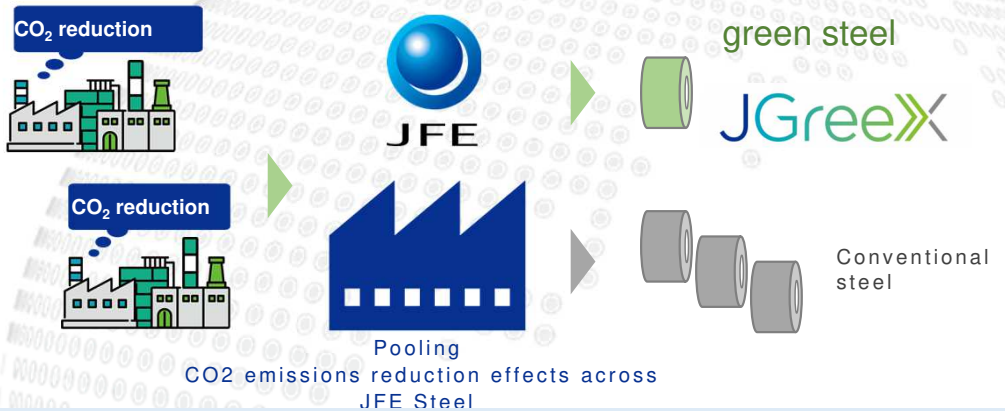
- Started supplying green steel JGreeX™, which emits significantly less CO_2 than conventional products, in 1H of FY2023.
- The steel mass balance approach is applied to JGreeX™ to calculate CO_2 intensity and reduction level of steel product based on ISO standard, ensuring additionality and transparency with third-party certifications.

■ Overview of green steel JGreeX™

JGreeX (JFE + Green + GX)

Supply start	First half of FY2023
Supply capacity	Approx. 200,000 tons (FY2023)
Target products	All steel products produced by JFE Steel
Certification body	Nippon Kaiji Kyokai (ClassNK)

■ Overview of the steel mass balance approach



STEP.1

Calculate the emissions intensity of any steel product to apply this approach

STEP.2

Identify emissions reduction projects and determine their emissions reduction levels

STEP.3

Issue a reduction certificate based on the determined reduction level, grant the certificate, and supply steel materials.

※ In addition to blast furnace companies in Japan, ArcelorMittal, Thyssenkrupp, and POSCO have also developed products as green steel brands based on the mass balance approach, and started selling them in some areas.

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Adoption of JGreeX™: Achievements

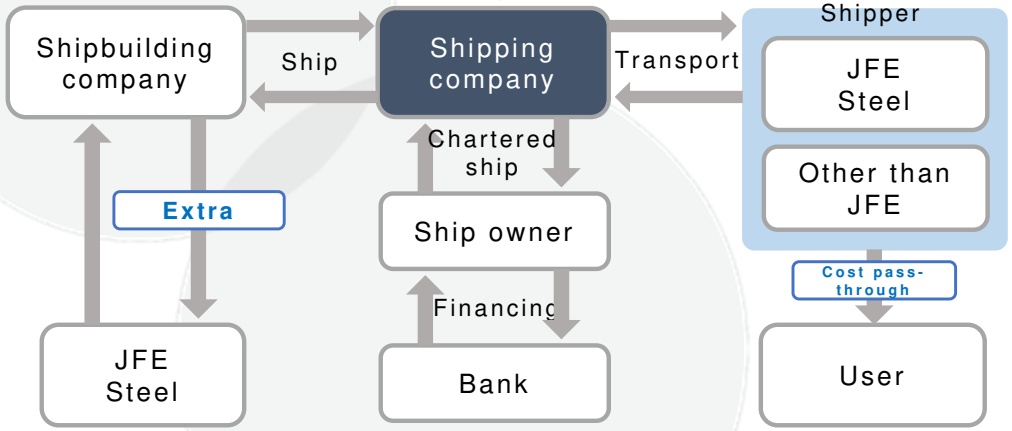
Environmental Vision 2050

- With recognition of the value of green steel JGreeX™ in reducing CO_2, the products have been adopted in ships (14,000 tons), buildings (200 tons), and grain-oriented electrical steel sheets for transformers manufactured in Europe (300 tons).
- Became the first in the world to develop a model to broadly share CO_2-reduction costs across the supply chain, while also contributing to consumers' Scope 3 emissions reduction.

■ Developing a model to share CO_2-reduction costs throughout society

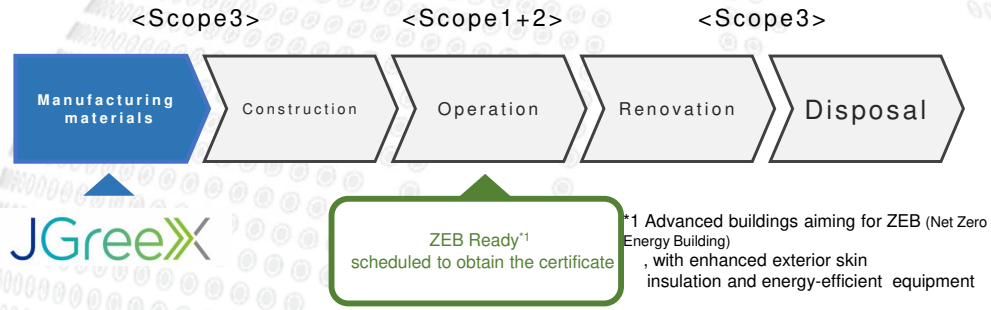
- **Became the first in the world**, together with eight Japanese shipping companies, to **develop a model** to broadly share CO_2-reduction costs **across the supply chain**
- Sales volume: 14,000 tons

NYK Bulk & Projects Carriers, Ltd., MOL Drybulk Ltd., Toko Kaiun Kaisha, Ltd., Kawasaki Kisen Kaisha, Ltd., Kawasaki Kinkai Kisen Kaisha, Ltd., Daiichi Chuo Kisen Kaisha, Ltd., Daiichi Chuo Kinkai Kaisha, Ltd., and Eastern Car Liner, Ltd.



■ Contributing to reducing the lifecycle carbon footprint of buildings

- **Contributing to CO_2 reduction** in manufacturing materials for new buildings
- **Sales volume: 200 tons**



*1 Advanced buildings aiming for ZEB (Net Zero Energy Building), with enhanced exterior skin insulation and energy-efficient equipment

PREX

(tentative name) Suidobashi PREX Project

Operator	Sumitomo Corporation
Designer and executor	Kumagai Gumi Co., Ltd. (scheduled)
Building structure	Steel structure, 10 floors above ground

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Business Growth Strategy through the Supply of Green Steel

Environmental Vision 2050

- Increasing the mix of highly value-added products such as high tensile steel sheets and electrical steel sheets to 50+%, shifting the focus from Quantity to Quality, and aiming for business growth by shifting from high-quality steel to green steel.
- Expanding the supply capacity of green steel is critical for maintaining and expanding the international competitiveness of not only the domestic steel industry but also consumer industries, including automobiles and electronics.

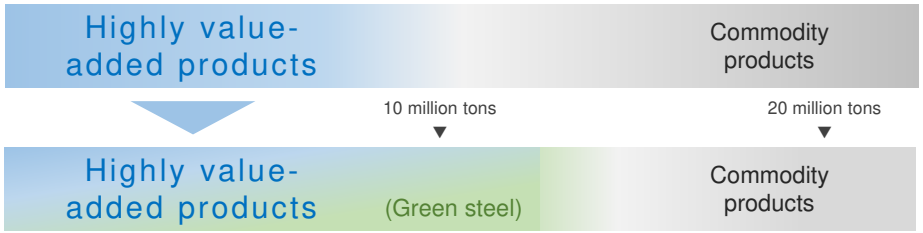
■ Medium-term business growth strategy

Expand margins and achieve stable profit by shifting the focus from Quantity to Quality

Increase **the mix of highly value-added products* to 50+%**

* Products that offer technological advantages, are recognized by customers for their value-added, and have greater earnings power than commodity products

FY2022 non-consolidated steel shipments: 21.74 million tons



<Highly value-added products: main examples>

High grade electrical steel sheets

High tensile steel for automobiles

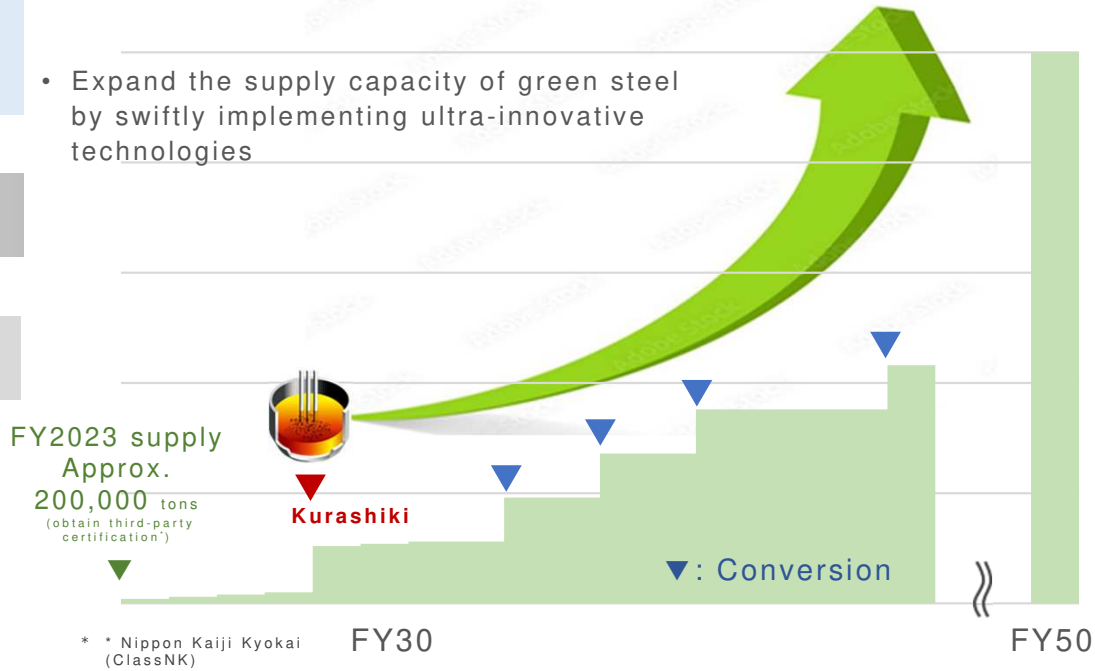
Steel for offshore wind power

■ Green steel supply: image

green steel

JGreeX

- Expand the supply capacity of green steel by swiftly implementing ultra-innovative technologies



* Nippon Kaiji Kyokai (ClassNK)

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Contributing to CO_2 Reduction by Expanding Electrical Steel Sheet Production Capacity

Environmental Vision 2050

- Contributing to CO_2 reduction by increasing the production of top-grade non-oriented electrical steel sheets (NO) used for primary motors of EVs and HEVs that are growing in demand globally.
- JSW and JFE Steel have jointly established a new company, JSW JFE Electrical Steel Private Limited, to manufacture and sell grain-oriented electrical steel sheet (GO). It is the first in India to manufacture high-grade GO in an integrated manner, contributing to greener energy network enhancement projects.

■ Expanding non-oriented electrical steel sheet production capacity (Kurashiki District)

News release in April 2021

CAPEX	Approx. 49.0 billion yen
Expected time to start production	First half of FY2024
Production capacity	Doubling the facility's existing capacity for producing top-grade NO for EV primary motors

News release in May 2023

CAPEX	Approx. 46.0 billion yen
Expected time to start production	By the end of FY2026
Production capacity	Tripling the facility's existing capacity for producing top-grade NO for EV primary motors

■ Establishing a joint venture company for grain-oriented electrical steel sheet (JSW in India)

JFE 50% : JSW 50%

Investment ratio

Provide technology

Supply sheets

JSW Steel Limited's Vijayanagar facility

Contribution to CO_2 reduction (total)*: Approx. 4.8 million tons/year

*: Contribution to CO_2 reduction resulting from an increase in EVs (estimated by JFE Steel) and from transmission replacement (estimated by JFE Steel based on JISF data)

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Contributing to CO_2 Reduction through Large and Heavy Steel Plates for Offshore Wind Power

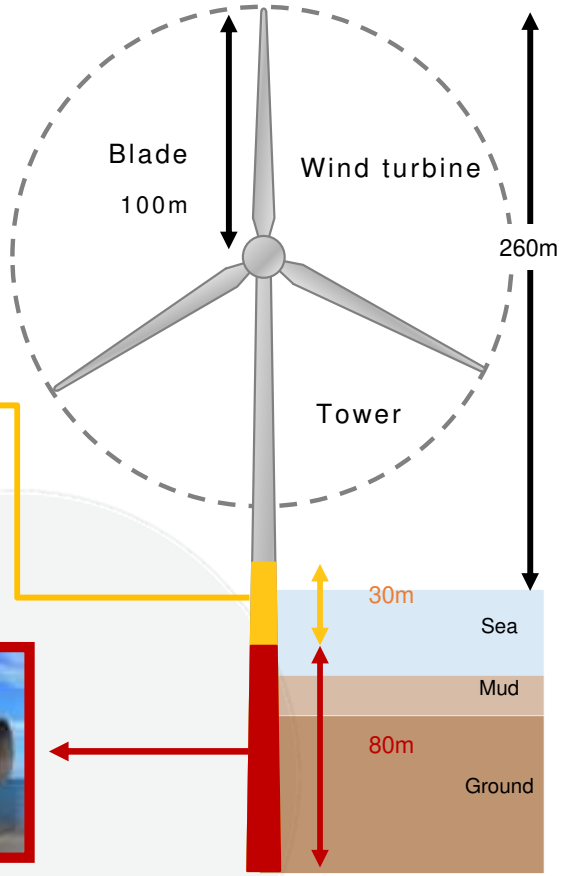
Environmental Vision 2050

- The Japanese government has positioned offshore wind power generation as a key factor for carbon neutrality.
- J-TerraPlate™, a large and heavy steel plate produced and supplied by JFE Steel, has been selected for the first time for the production of bottom-fixed monopile foundations for offshore wind power generators.
- The JFE Group (JFE- Gr) will continue its groupwide efforts to promote the expansion of green energy, aiming to contribute to the decarbonization of society as a whole.

■ Overview of a land-based offshore wind power generator

Transition pieces
- Diameter: 9 to 11 meters
- Weight: Approx. 500 tons

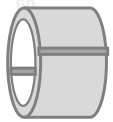
Monopiles
- Diameter: 9 to 11 meters
- Weight: Approx. 1,400 tons



■ Strengths of JFE-Gr in monopile manufacturing

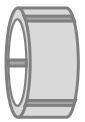
Integrated manufacturing and operation	From the production of large and heavy steel plates for offshore wind power (J-TerraPlate™) and the manufacture of bottom-fixed monopile foundations to O&M in an integrated manner
Size of large and heavy steel plates	Facilities capable of manufacturing large and heavy steel plates for the largest-scale offshore wind power plants in Asia

<Large and heavy steel plates>



- Fewer welds
- Longer tubes

<Conventional products>



- More welds
- Shorter tubes

✓ Reduction of welding, reduction of assembly man-hours, shorter production lead time

Contribution to CO_2 reduction (expected)*: Approx. 1.2 million tons/year

*: Contribution to CO_2 reduction resulting from the introduction of offshore wind power generation (estimated by JFE Steel based on JISF data)

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04 CO_2 Reduction Through Efficient Use of Resources

- Contributing to a Recycling-based Society by Recycling Plastic Waste
- Contributing to Biodiversity Through Steel Slag Products

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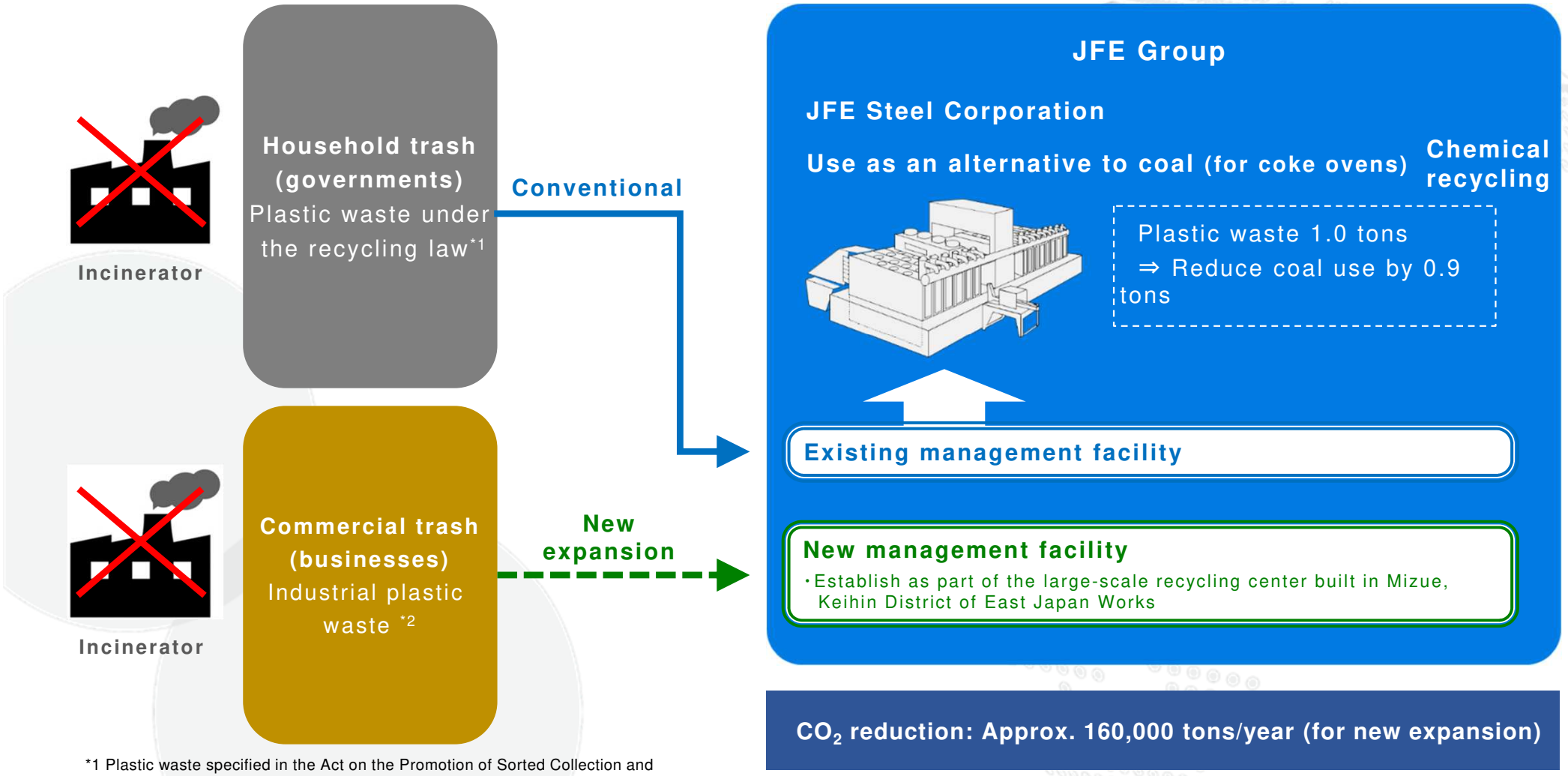
Contributing to a Recycling-based Society by Recycling Plastic Waste

- The steel industry is promoting reductions in CO_2 emissions by recycling waste plastic, which is normally incinerated.
- In addition to conventional domestic plastic waste under the recycling law*1, JFE has also started utilizing industrial plastic waste*2, accelerating its efforts by increasing the types of plastic waste and the amount of alternative utilization.



*1 Plastic waste specified in the Act on the Promotion of Sorted Collection and Recycling of Containers and Packaging
*2 Plastic waste derived from industrial waste

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Contributing to Biodiversity Through Steel Slag Products

- Created a seaweed bed in Shinto, Iwakuni City, Yamaguchi Prefecture, by utilizing Marine Stone®, a steel slag product for marine areas.
- Obtained J Blue Credit®*1 certification for approximately 80 tons of CO_2 captured by blue carbon*2.
- Promoting contribution to the preservation of biodiversity by utilizing steel slag products that are helpful for the recycling-based society.

*1: Established by the Japan Blue Economy Association (JBE) in 2020. It is a credit system certified, issued, and managed by the JBE through an independent committee review.
*2: Carbon captured by marine ecosystems, such as marine plants and seaweed beds. It is a new term coined by the UNEP in October 2009 as a new carbon sink.

■ Obtaining J Blue Credit® certification

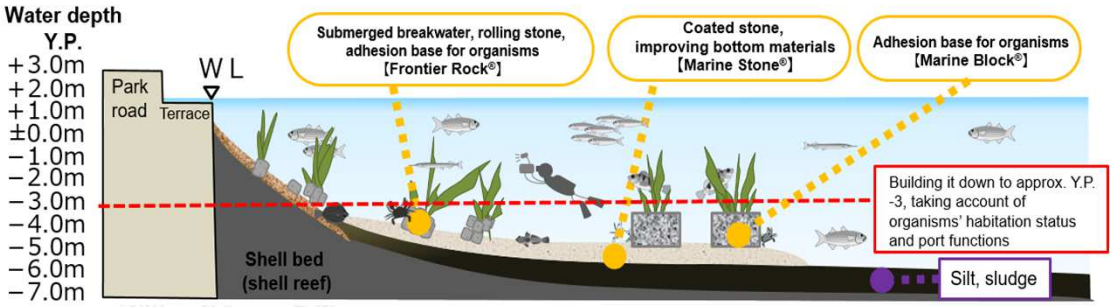
◎ **Creation of a seaweed bed** in **Shinto**, **Iwakuni City**

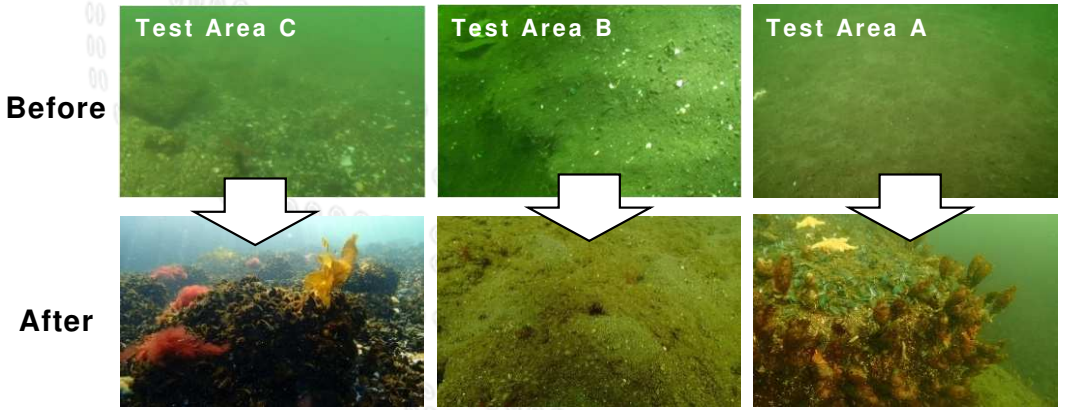
- Used Marine Stone® to create and expand a base for the growth of a rocky reef seaweed bed
- Utilizing it for education and research. Confirmed the co-benefits of seaweed bed creation, including fish attraction.

■ Initiatives in Tokyo Bay

◎ Collaboration with **Yokohama City** to **enrich the ocean**

- Collaborating with Yokohama City to promote the improvement of marine habitats by using steel slag products





Confirmed improvement in marine habitats through the use of steel slag products

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05 East Japan Works(Keihin District) Land Use Scheme

- JFE-Gr Land Use Scheme: “OHGISHIMA 2050”
- Carbon Neutrality Business in OHGISHIMA 2050

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JFE-Gr Land Use Scheme: “OHGISHIMA 2050”

Environmental Vision 2050

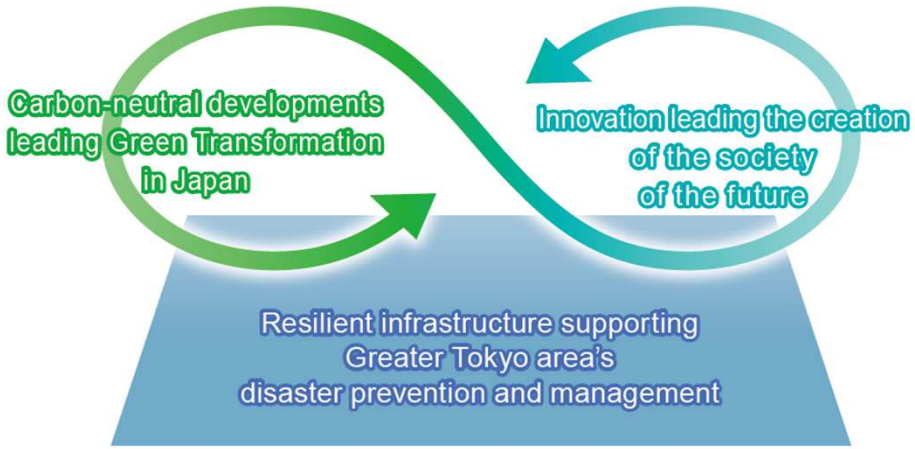
- Developed OHGISHIMA 2050 as the land use scheme of East Japan Works (Keihin District) after the suspension of its upstream process, including blast furnaces, along with implementation of structural reform to build the optimum production system in Japan.
- Contributing to the sustainable development of local communities and society by creating new industries and employment for the next 100 years, realized through the creation of a field to take on new challenges to achieve carbon neutrality and innovation.

Concept of land use

* Details of OHGISHIMA 2050 (in Japanese)
https://www.jfe-holdings.co.jp/release/2023/09/pdf/230907.pdf

Aim to solve the country’s key issues and help sustainable development of the Keihin coastal area

- **The city leading Japan’s carbon neutrality**
  (forming a supply base for next-generation energy, including hydrogen)
- **The city of innovation helping nurture next-generation industries**
  (promoting the implementation of future technologies in society)
- **The city of resilience helping disaster prevention in the metropolitan area**
  (Contribution that takes advantage of convenient access)



(Ohgishima District in 2050: perspective drawing)

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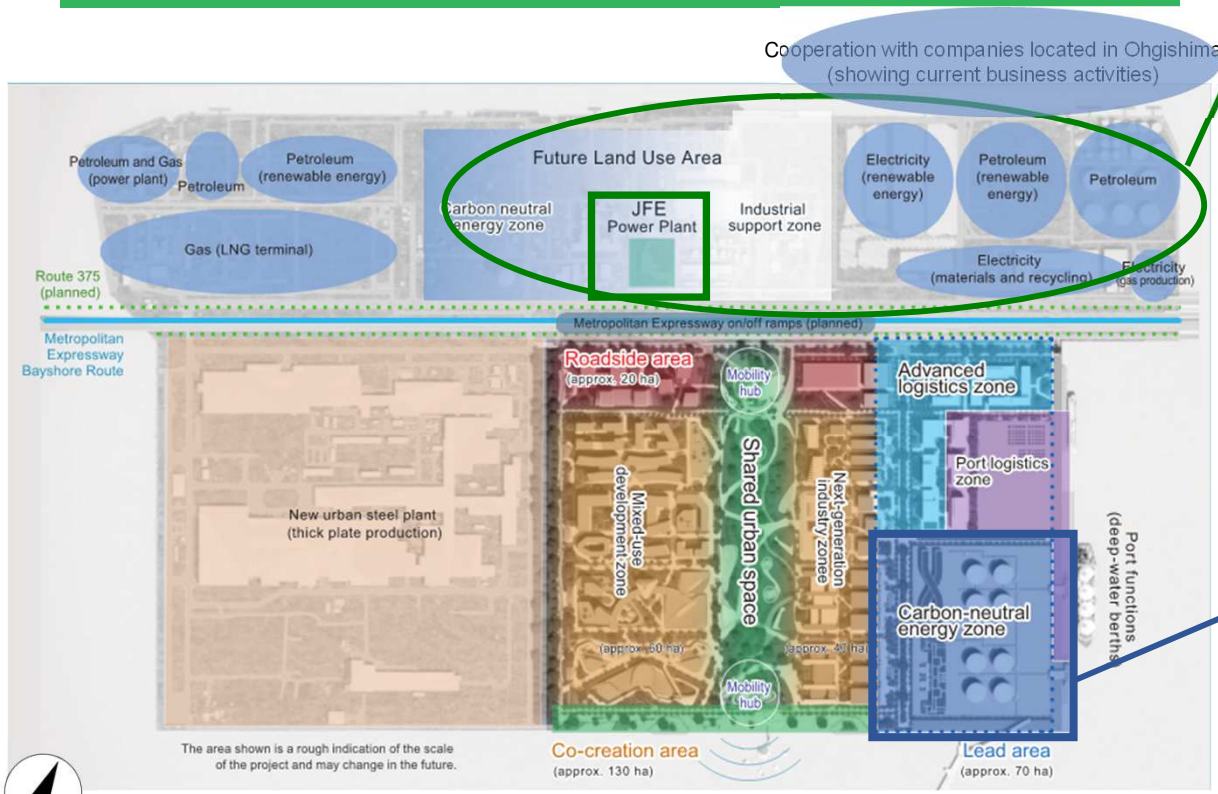
Carbon Neutrality Business in OHGISHIMA 2050

Environmental Vision 2050

- The lead area will utilize deep water berths to form a hydrogen supply base, leading to carbon neutrality and land use conversion for the entire area.
- In another area, a shared urban space with abundant greenery will be created as a central axis, equipped with the latest infrastructure supporting DX and GX.
  On both sides of the space, the next-generation industry zone and the integrated development zone will be created, aiming to build up next-generation industries and facilities.
- Considering new carbon neutral businesses across the group

Zoning and business use by the JFE Group



Carbon neutral business

- **CO_2 business (EN, ST, SH)***
  - Business involving collection and shipment of CO2 emitted by nearby energy companies, etc. (CCUS)
- **Electricity business (ST, EN)**
  - Business to generate, store, and sell clean electricity by introducing hydrogen at power plants

Carbon neutral energy zone

- **Business participation in the supply ch ains of hydrogen, ammonia, etc. (ST, EN, SH)**
- Ohgishima, located in the Kawasaki coastal area, was selected as the leading candidate to host test projects aiming to build a large-scale hydrogen supply chain.

* ST: JFE Steel; EN: JFE Engineering; SH: JFE Shoji

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06 Collaborating with Society on Carbon Neutrality

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Collaborating with Society on Carbon Neutrality

- While achieving carbon neutrality is a top management priority for JFE Steel, generating environmental value involves large investments and cost increases associated with transitioning, requiring efforts beyond the private company level.
- Mechanisms are needed so that society, as the beneficiary of green steel, helps to cover the associated cost increases through government support, collaborative initiatives, etc.

Initiatives as a private company

- Solidly execute ultra-innovative technologies and formulate plans to implement them in society
- Raise public awareness of environmental value created through green steel, applying the mass balance approach
  <Green steel guidelines and setting international standards>
  (The Japan Iron and Steel Federation, World Steel Association)
- Visualize environmental value and participate in the implementation of the new Global Data Collection Framework agreed upon by the G7
- Formulate a plan to develop infrastructure for the low-cost, stable, large-scale supply of carbon-free hydrogen and electricity
- Formulate a plan to develop CCUS and green infrastructure through collaboration with industrial complexes, corporations, etc.

Achieve economic growth through decarbonization

Build a competitive advantage through government-private collaboration

Necessary government support

- Clarify detailed frameworks and schedules on long-term government support for large-scale R&D costs and capital investments
- Ensure government support comparable to that in Europe and the US (e.g., subsidies, tax mechanisms) and international competitiveness of industrial electricity prices
- Provide support for building a green hydrogen supply chain that will become the new infrastructure
- Take measures to stimulate demand for green steel, which has high environmental value, through procurement support (e.g., public procurement)
- Relax the application of competition laws in order to not hinder the promotion of innovation and joint efforts by companies

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