JFE Group Future Created Environmental Management Strategy

JFE Group Environmental Management Strategy

May 29, 2025

JFE Holdings, Inc.

JFE Steel Corporation

JFE Engineering Corporation

JFE Shoji Corporation

JFE Group's Mission for Global Environmental Conservation

<Environmental Philosophy>

The JFE Group puts top priority on protecting and enhancing the global environment to maintain its business in harmony with the environment and ultimately for the prosperity of society as a whole

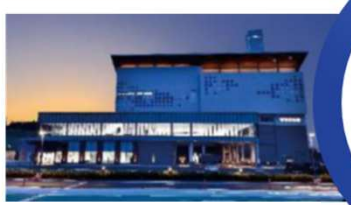
Grain-oriented electrical steel sheet

Offshore wind power generation

CN Carbon neutrality

Addressing climate change

Transition to a circular economy



Waste-to-energy power generation (Izumo)

CE Circular economy

NP Nature positivity

Biodiversity conservation and nature restoration

Bio-Tope Cita

Marine block

Processed and created based on Ministry of the Environment "Current Status of Environmental, Economic, and Social Conditions and Directions for Development of Environmental Policy" (January 2023)

Building an environmental management system as a unified group, setting "climate change issues" as well as "transition to a circular economy" and "biodiversity conservation" as important issues in the Eighth Medium-term Business Plan. Actively contributing to solving global environmental issues.

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1. Initiatives for Climate Change Issues

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I. JFE Group's Basic Policy for Climate Change Initiatives

~Toward Achieving 2050 Carbon Neutrality~

- **Climate change issues are extremely important management challenges from the perspective of business continuity**
- With the manifestation of extreme weather and other phenomena, **urgent response to global climate change issues is required**

・Positioning 2020 as a pivotal year for promoting climate change response and advancing GHG reduction activities

・Continuing to prioritize this as the most important issue in the Eighth Medium-term Business Plan, aiming to achieve carbon neutrality by 2050

Initiatives toward 2050 Carbon Neutrality

● Accelerating research and development of new technologies and **challenging ultra-innovative technologies**

- Steel business GHG emission reduction … Carbon recycling blast furnace technology development, etc.

● Promoting expansion of **business opportunities** that **contribute to achieving a sustainable society**, not just **responding to business risks**

- Expanding contribution to GHG reduction across society … Renewable energy generation business, eco-products, etc.
- Offshore wind power generation business initiatives … Monopile manufacturing, O&M, etc.

II. Initiatives for Achieving 2030 GHG Emission Reduction Target in Steel Business

① GX2040 Vision and JFE Vision 2035

② Strengths of Japanese Steel Industry

③ Technological Multi-track Approach for Carbon Neutrality

④ Direction of Process Transformation (Transition Period)

⑤Action for Achieving 2030 Emission Reduction Target

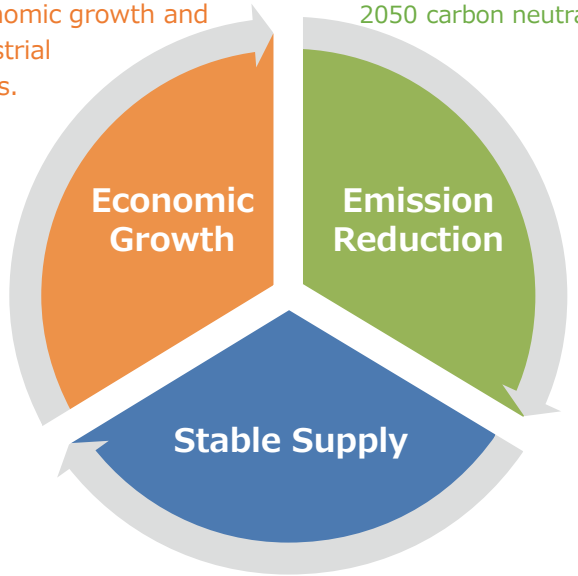
- Kurashiki Innovative EAF Construction Plan
- Progress of Middle East Direct-Reduced Iron Project
- GHG Emission Reduction through Use of Direct-Reduced Iron in Blast Furnaces
- Corporate Total GHG Emission Reduction Plan
- Green Steel "JGreeX®" Adoption Result

"GX2040 Vision" and "JFE Vision 2035"

- GX is not only a response to urgent climate change measures but also a big chance to break through Japan's economic stagnation of 30 years and get back on a growth trajectory through expanded investment in decarbonization fields.
- Through GX investment, we aim for new industrial structure those are 1)innovative GX businesses are continuously born by revolutionary technologies, and 2)Japan's strength of consistent supply chains from materials to products is enhanced using decarbonized energy and DX.
- JFE has formulated the JFE Group Long-term Vision "JFE Vision 2035". JFE Group aims to become the Leader in technology development toward carbon neutrality.

"GX2040 Vision"

- Japan's decarbonization-related technologies have strength, and utilize digital technologies, (AI, etc.) to achieve economic growth and enhanced industrial competitiveness.
- Acceleration of urgent climate change measures
- International commitments of 2050 carbon neutrality



Source: 13th GX Implementation Meeting "Toward Accelerating Japan's Green Transformation" (October 31, 2024, Minister in Charge of GX Implementation)
https://www.cas.go.jp/jp/seisaku/gx_jikkou_kaigi/dai13/siryou1.pdf
GX2040 Vision Overview (February 18, 2025, Cabinet Secretariat GX Implementation Office)
https://www.meti.go.jp/press/2024/02/20250218004/20250218004-3.pdf edited by JFE

"JFE Vision 2035"

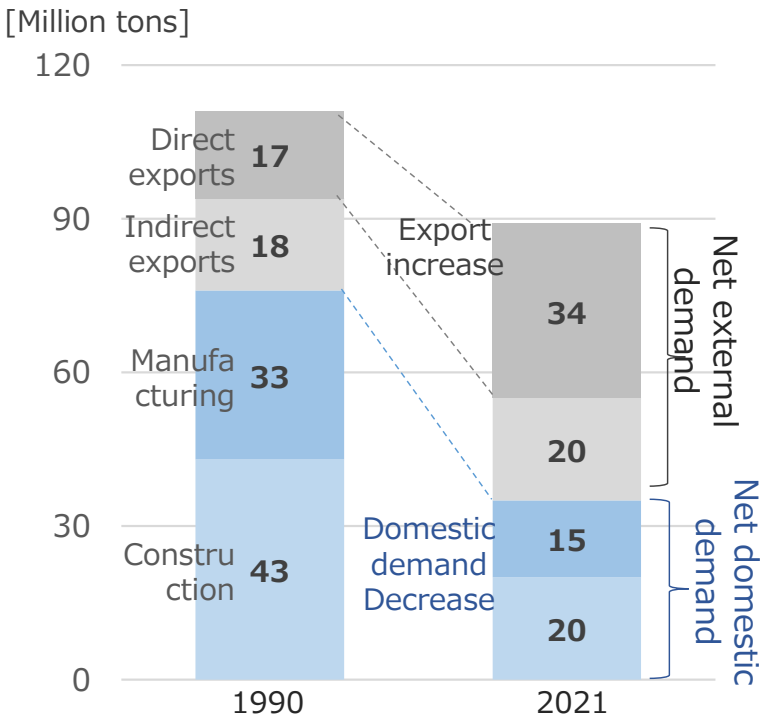
- **Become the Leader in CN technology development**
  - **Development completion of ultra-innovative process transforming technologies**
  - Provide a diverse eco-product lineup backed strong technological capabilities and to help conserve the global environment
  - **Become a main player** in the high-quality **green steel market**

Dream for your Future, Steel takes you Further.

Strengths of Japanese Steel Industry (Steel Products attractiveness)

- Japanese steel industry has been underlying Japan's industries by supplying world-class high-quality steel materials through internationally high technological and development capabilities, and has contributed to Japan’s industrial earning power through direct and indirect exports.
- Looking ahead to 2050 carbon neutrality, we will convert high-quality steel materials to green steel and contribute to improving the competitiveness of the whole supply chain as the economy and society become greener.

Japan's Steel Demand



Source: Japan Iron and Steel Federation

Strengths of Japanese Steel Industry

With the green transformation of society, demand for high-quality, high-function steel materials such as electrical steel sheets and high-tensile steel sheets is increasing, creating business growth opportunities.

Example 1) xEV

Power efficiency improvement

Non-oriented electrical steel sheets

Vehicle weight reduction

High-tensile steel sheets

Example 2)
Power infrastructure construction

Offshore wind expansion

Large and heavy steel plates

Supplying Asia's largest weight thick plate products (JFE)

Conversion efficiency improvement

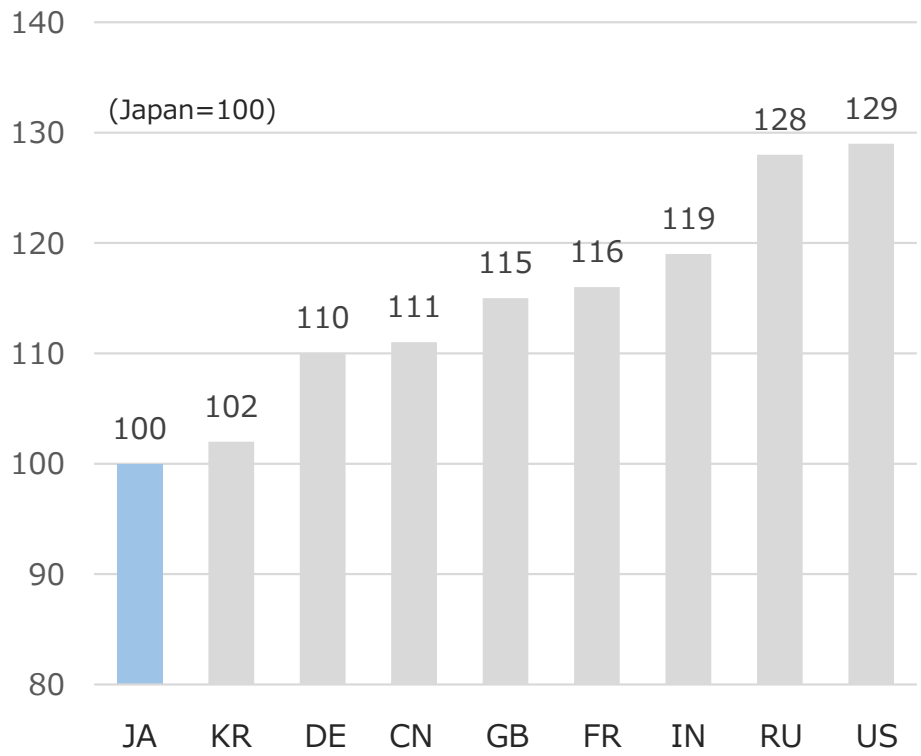
Grain-oriented electrical steel sheets

High-grade electrical steel sheets can only be manufactured by a few companies worldwide, including Nippon Steel and JFE.

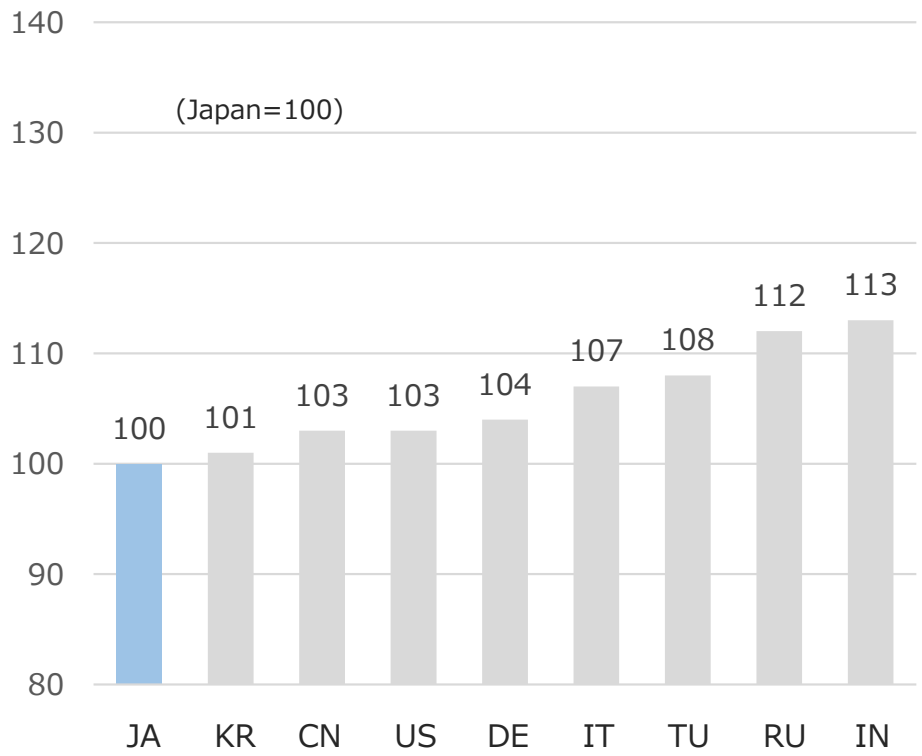
Strengths of Japanese Steel Industry (Highest Level Energy Efficiency in the world)

- Japanese steel industry's product manufacturing processes persist world-class energy efficiency, and even now are supplying steel products with low energy intensity to society.
- In action for carbon neutrality, it is the mission of Japanese steel industry to persist and improve this strength and continue to be the Leader through early implementation of ultra-innovative technologies.

Primary Energy Intensity Estimation Results (Converter Steel)



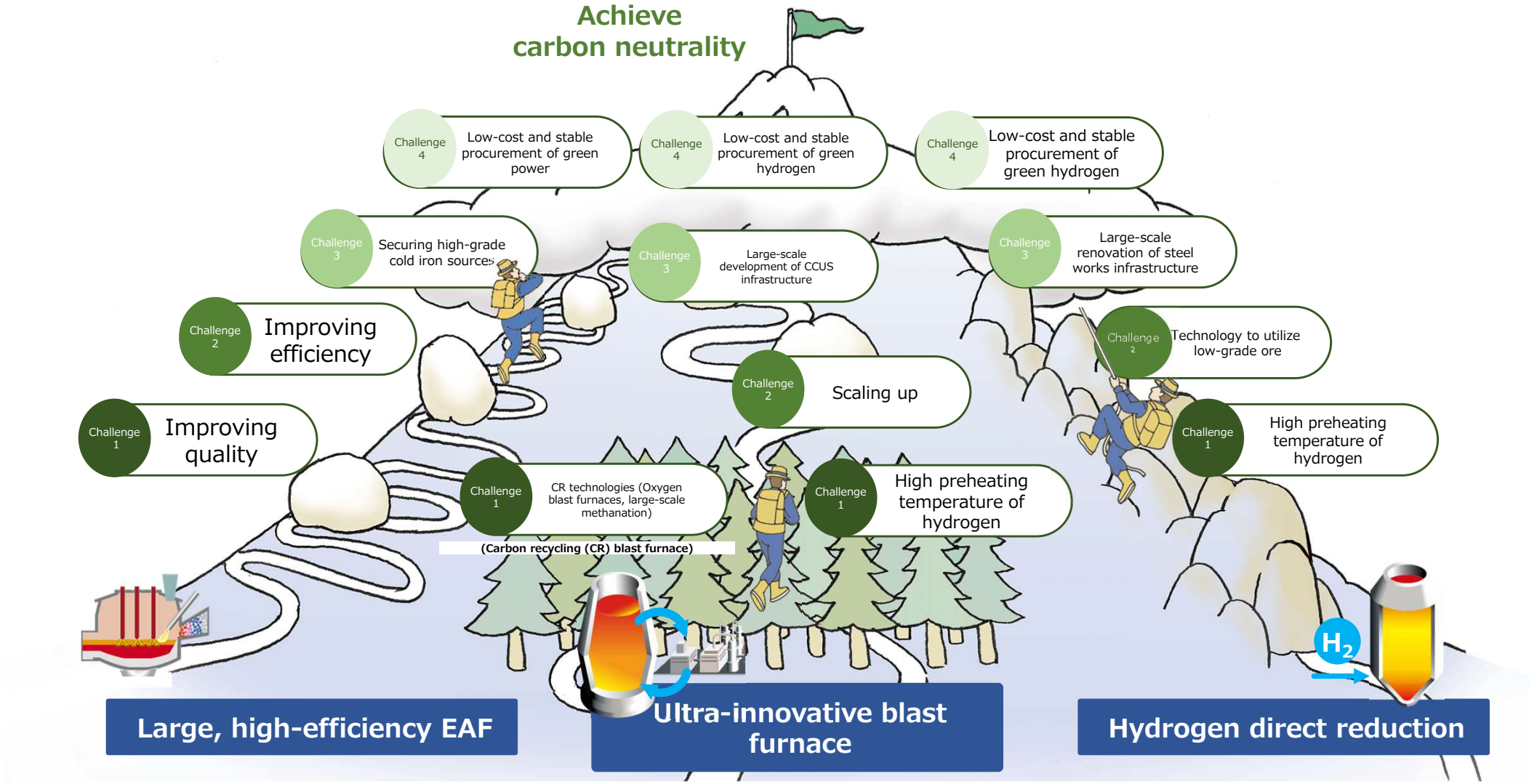
Energy Intensity Estimation Results (Scrap Electric Furnace Steel)



Source: Estimation of energy intensity as of 2019 (Research Institute of Innovative Technology for the Earth (RITE), Akita University Graduate School of International Resource Sciences, Junichiro Oda) edited by JFE
https://www.rite.or.jp/system/global-warming-ouyou/download-data/Comparison_EnergyEfficiency2019steel.pdf

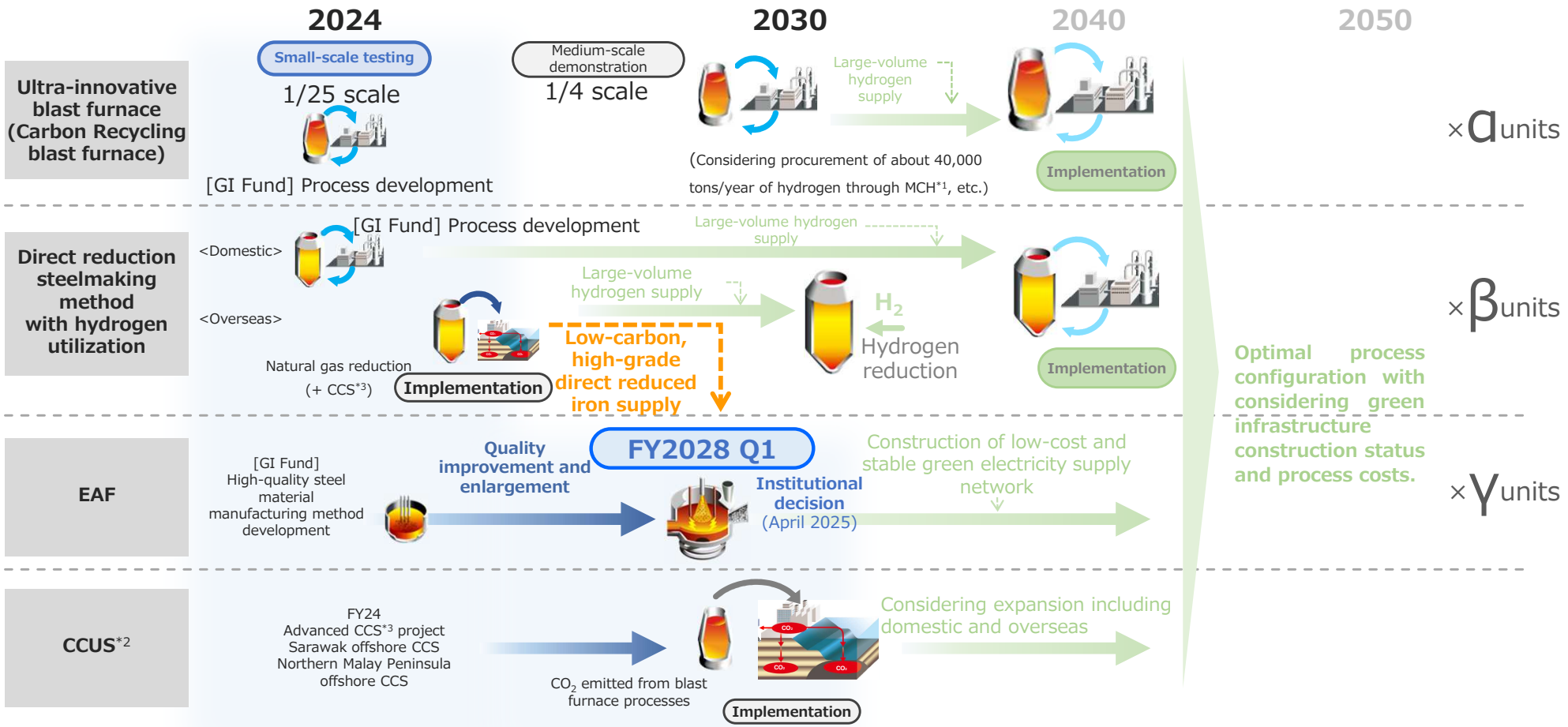
Technological Multi-track Approach for Carbon Neutrality

- Along the way to reaching carbon neutrality (something like climbing to the summit) by 2050, there are variety technical paths and numerous challenges.
- The fastest way to the summit is unpredictable, a multitrack approach is essential in driving technological development.
- Although it is difficult to achieve the goal by only company itself, we will progress steady with government subsidy (GI Fund: Green innovation fund) support.



Direction of Process Transformation (Transition Period)

- In the GI Fund project, we have started small-scale testing of hydrogen utilization technology in ultra-innovative blast furnaces and direct reduction steelmaking methods.
- Among them, we consider it is possible to implement innovative EAF early on, we have made an institutional decision to convert the process of Kurashiki No.2 blast furnace, that renovation is scheduled for FY2028, aiming for GHG emission reduction and business growth.
- Process conversion from FY2030 onward will be comprehensively judged and planned considering the construction of low-cost, stable, and large-volume supply networks for hydrogen and electricity, demand for green steel materials, and other factors



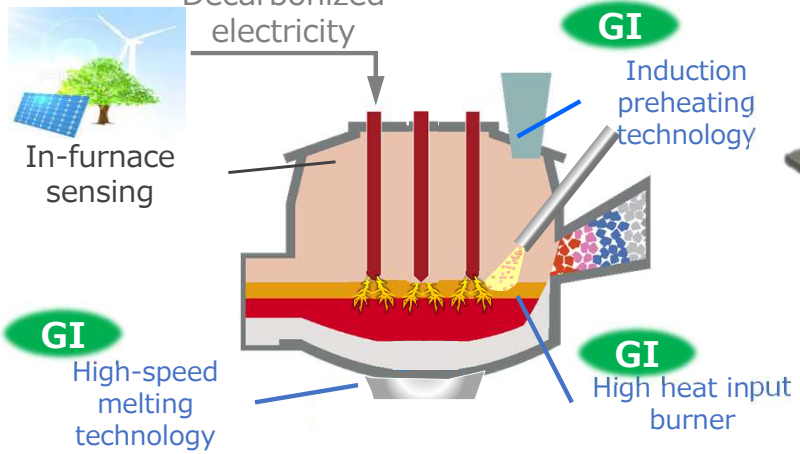
*1 MCH (Methylcyclohexane):
One type of hydrogen carrier, a liquid made by adding hydrogen to toluene

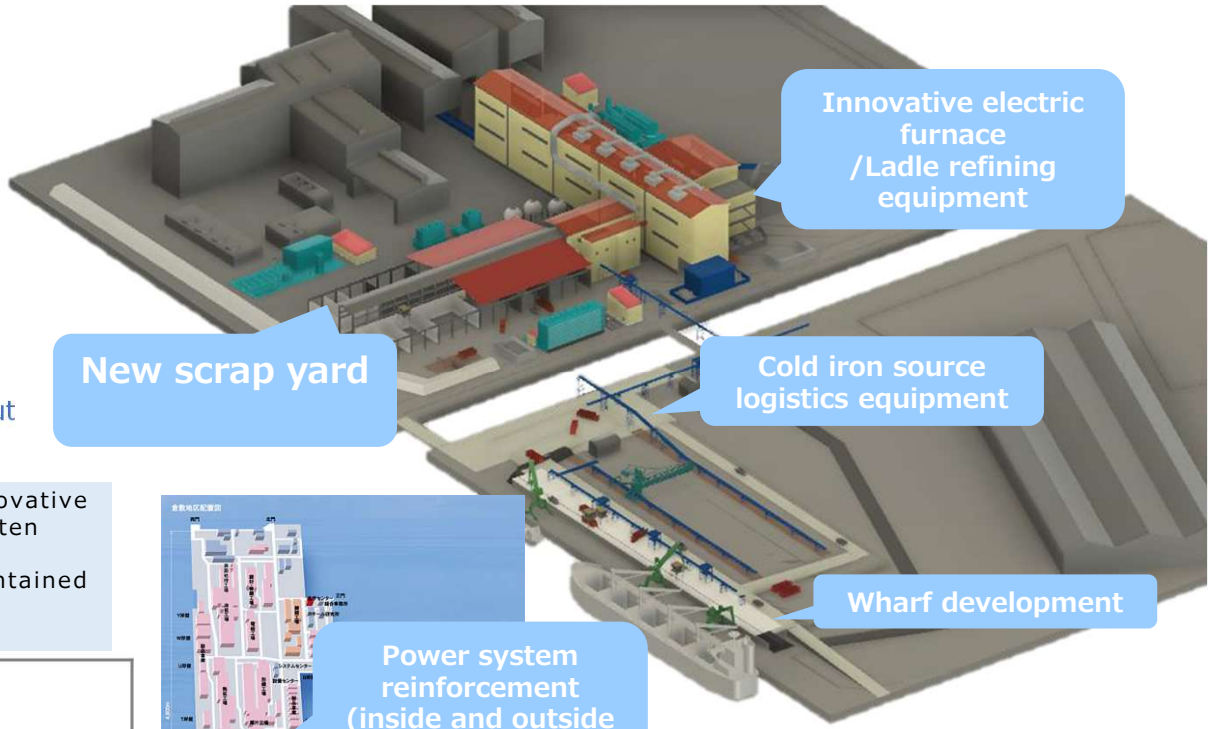
*2 CCUS: Carbon dioxide Capture, Utilization and Storage
*3 CCS: Carbon dioxide Capture and Storage

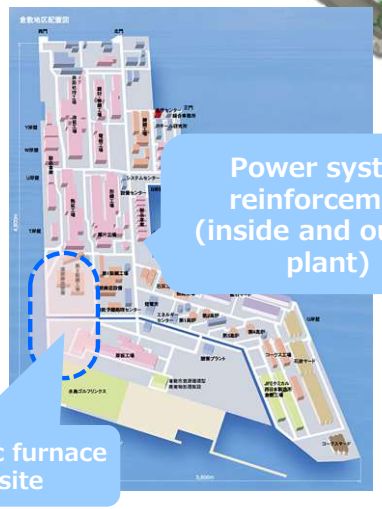
Kurashiki Innovative EAF Construction Plan

- The Kurashiki innovative Electric Arc Furnace*1 was adopted for the Government subsidy project*2. We made institutional decision after receiving subsidy decision on April 9, 2025.
- Through utilization of existing electric furnaces and JFE's laboratory tests, we have theoretically established prospects for high-quality and high-efficiency technology. Testing electric furnace using GI Fund, we will promote further development of high efficiency melting technology for mass production of high-quality green steel materials and implement development results.
- By the world's largest scale innovative EAF, we realize ahead of other companies a mass supply system for high-quality, high-function steel materials that could not be manufactured by existing large electric furnaces, we aim for top share in the domestic green steel market.

*1 High-efficiency, large innovative electric furnace capable of manufacturing high-quality, high-function steel materials
*2 Support for Energy and Manufacturing Process Conversion in Industries Where Emission Reduction Is Difficult (Project I (Steel))







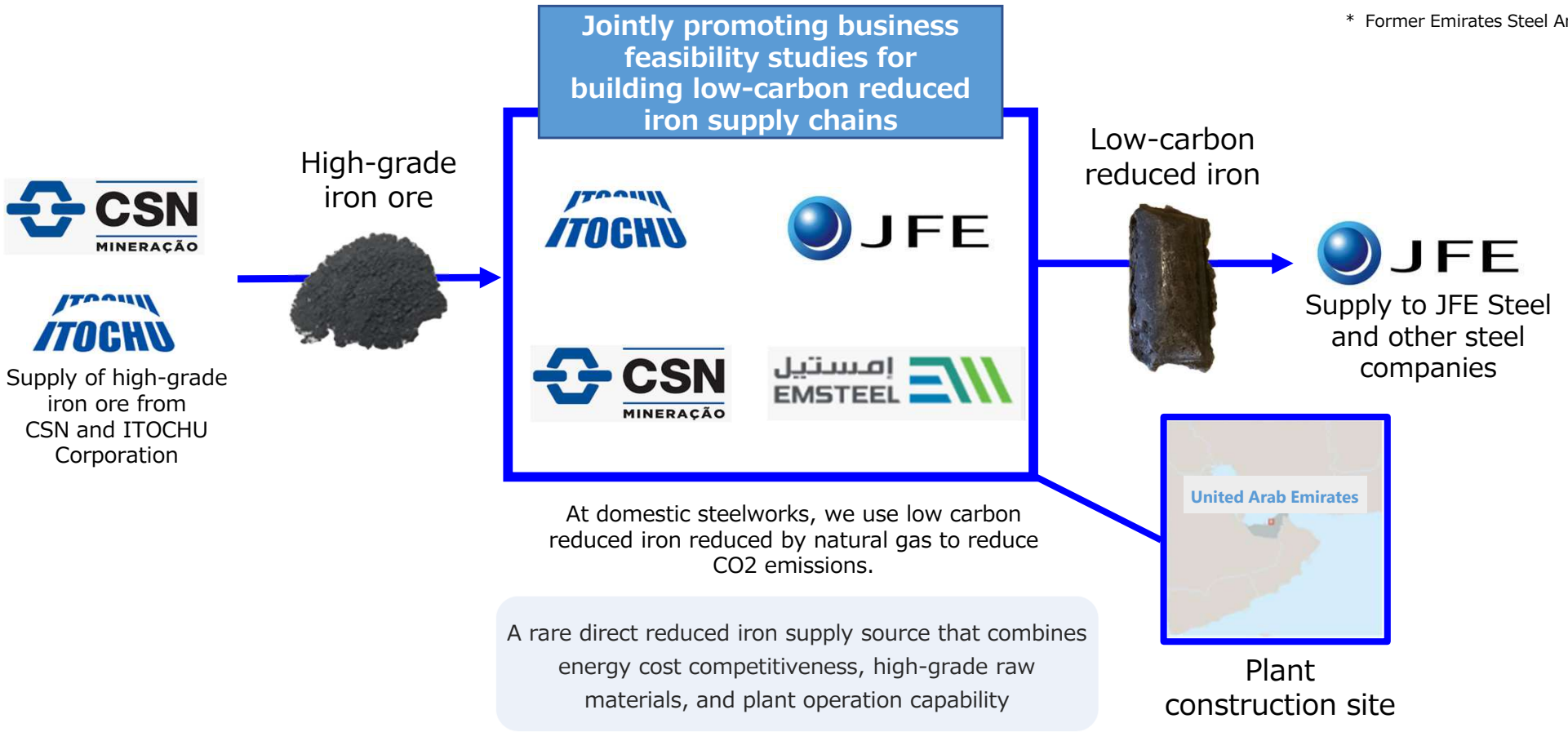
- Establish high-efficiency melting technology through innovative process technologies such as heat-efficient burners, molten steel stirring coils, and induction preheating.
- Establish technologies to reduce impact of impurities contained in scrap. To achieve levels of phosphorus and nitrogen comparable to the blast furnace process.

Investment scale	329.4 billion yen (Government subsidy upper limit: 104.5 billion yen)
Investment content	Innovative electric furnace, ladle refining equipment, cold iron source logistics equipment, wharf development, power receiving and distribution equipment, etc.
Production capacity	Approximately 2 million tons/year
Production start	FY2028 Q1
CO_2 reduction effect	Approximately 2.6 million tons/year

Progress of Middle East Direct Reduced Iron Project

- It is necessary to secure stable direct reduced iron procurement sources for high-quality steel manufacturing in innovative EAFs and GHG emission reduction in the blast furnace process.
- We are conducting specific business scheme discussions with EMSTEEL* (UAE), ITOCHU Corporation, and CSN Mineração S.A. (Brazil) to build a low-carbon direct reduced iron supply chain in Abu Dhabi.
- After determining the business scheme, we plan to start direct reduced iron production (approximately 2.5 million tons annually) under a joint venture company established in the UAE. we will be the largest off-taker and procure direct reduced iron on a long-term stable basis, primarily for the innovative EAF or electric arc furnace that will operate in FY2028.

* Former Emirates Steel Arkan

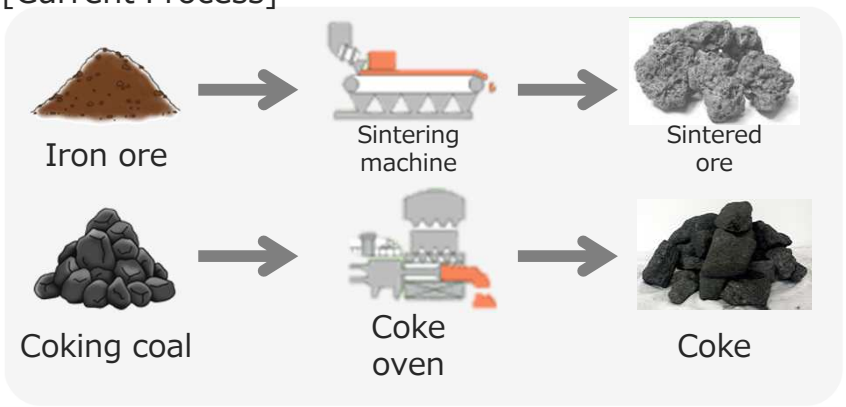


GHG Emission Reduction through Use of Direct-Reduced Iron in Blast Furnaces

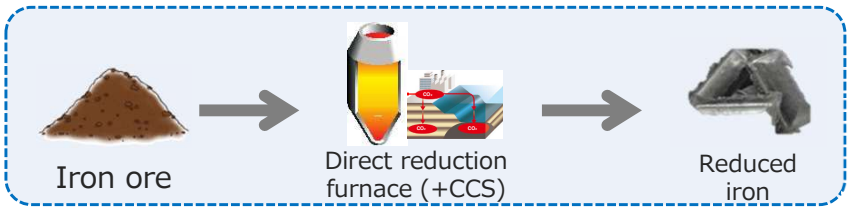
- In the blast furnace process, iron ore (iron oxide) is reduced with coke (carbon) for manufacturing, inevitably emitting CO2, but by charging reduced iron as an alternative to iron ore, the amount of coke used as reductant can be reduced.
- JFE made an institutional decision for GX investment (approximately 6 billion yen) to utilize reduced iron in Chiba No.6 blast furnace with support from the 2024 "Subsidy for the Energy Conservation Investment Promotion and Demand Structure Transformation Support Project."
- Going forward, we will judge on expanding reduced iron utilization to each district in line with progress of the Middle East reduced iron project.

Steel Manufacturing Flow

[Current Process]



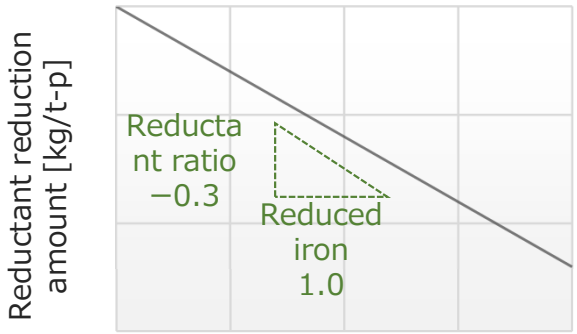
[New Process]



(Overseas)
Securing low-cost and stable low-carbon reduced iron procurement sources
from Middle East reduced iron project

(Domestic)
Handling and logistics
New continuous charging equipment

GHG Reduction Effect



Coke (reductant) usage is significantly reduced by charging large amount of reduced iron into blast furnaces, Achieving CO2 emission reduction from blast furnace.

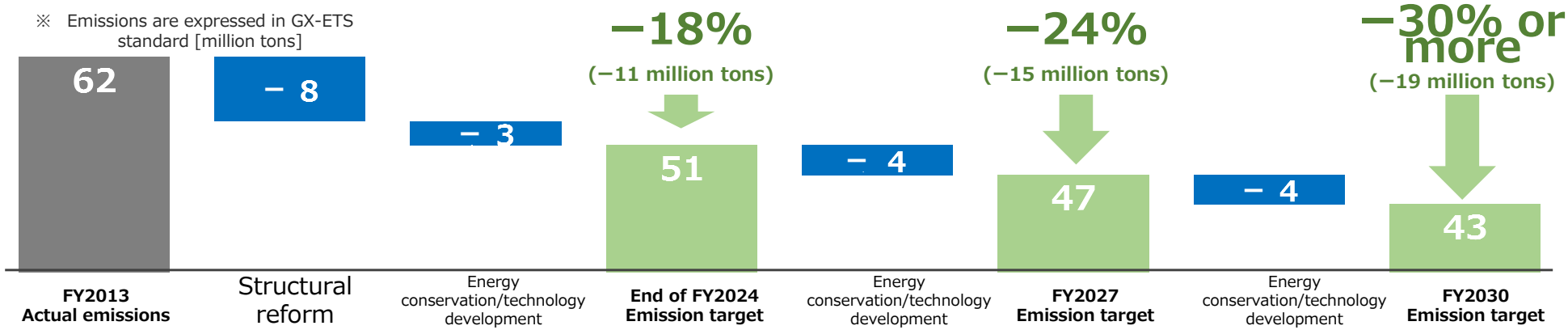
Reduced iron has different properties from conventional raw materials, including specific gravity, large shape, burrs at edges, and there are no examples of introducing continuous transport/charging equipment from raw material handling to blast furnaces.

Maximizing utilization of JFE Group technologies to develop advanced continuous transport equipment* that can handle all types of transport materials.
Maximize GHG emission reduction through continuous reduced-iron charging.

* Joint development between our company and JFE Engineering Corporation

Corporate Total GHG Emission Reduction Plan

- Setting an intermediate target of −24% emission reduction in FY2027 as a point on the linear path toward the FY2030 emission reduction target of −30% or more.
- GX investments that contribute to much amount of GHG emission reduction and to achieve the 2030 target, such as the Kurashiki innovative EAF and blast furnace reduced iron using investment, which most have been decided.
- For the FY2024 year-end emission reduction target of −18%, we proceeded with reduction investments through energy conservation and technology development as planned, and actual result is expected to exceed the reduction target.



End of FY2024 Toward −18% reduction

(compared to FY2013)

Emission reduction

100% achievement of GHG reduction target of 3.06 million tons through energy conservation/technology development

→In FY2023 results, 3.11 million tons (101%) exceeding target approved

Expected to exceed FY2024 emission reduction target of −18%

Toward FY2030 −30% or more reduction (Progress of GX investment)

Effect manifestation period	
~FY2024	Improve efficiency of power demand facilities Leverage AI & DS
~FY2027	Expand the use of scrap in converters (−1.5) Sendai: Upgrade existing EAFs (−0.1) Chiba: Introduce EAFs for SUS (−0.5)
~FY2030	Fukuyama: Update to high-efficiency coke oven (−0.2) **Use reduced iron in blast furnaces and converters** (−2.0) **Kurashiki: Innovative EAF** (high-efficiency and large) (−2.6)

* The projects in blue font are already approved. Numbers in parentheses indicate the amount of reduction potential (Million tons/year)

Green Steel "JGreeX®" Adoption Result

- Started supply of green steel "JGreeX®" that significantly reduces GHG emissions in manufacturing processes compared to conventional steel products from the first half of FY2023. In FY2024, adoption of "JGreeX®" expanded across all fields due to green steel demand stimulation.
- Toward −30% or more reduction in FY2030, we will steadily implement GHG reductions and expand green steel supply capacity to 3 million tons/year.

Industrial machinery

- ✓ **Yamaha Motor**

General consumer goods

- ✓ **Monofactory**

Transformers

- ✓ **Aichi Electric**
- ✓ **Eaton Corporation (USA)**
- ✓ **European transformer manufacturers**

Office buildings and distribution warehouses

- ✓ **Sumitomo Corporation**
- ✓ **Tomakomai Kuribayashi Transportation**
- ✓ **Nippon Fastener**
- ✓ **Fujiki Tekkou**
- ✓ **Mitsubishi Estate**
- ✓ **YASHIMANADA**
- ✓ **SUNSCO (Vietnam)**

Automotive

(Listed in alphabetical order)

- ✓ **Isuzu Motors**
- ✓ **Toyota Motor**
- ✓ **Nissan Motor**

Distribution

- ✓ **Hock Seng Hoe (Singapore)**
- ✓ **Mycron Steel Berhad (Malaysia)**
- ✓ **JFE Shoji Pipe & Fitting Corporation**

Bridges

- ✓ **Yokogawa Bridge (Okayama Prefecture)**
- ✓ **JFE Engineering (Yokohama City)**

Ships

- ✓ **Eastern Car Liner**
- ✓ **Kawasaki Kisen Kaisha, Kawasaki Kinkai Kisen Kaisha**
- ✓ **MOL Drybulk**
- ✓ **DAIICHI CHUO KISEN KAISHA**
- ✓ **Tsuneishi Shipbuilding**
- ✓ **TOKO KAIUN KAISHA**
- ✓ **NYK Bulk & Projects Carriers**

III. Initiatives for Achieving 2050 Carbon Neutrality in Steel Business

① Direction of Process Transformation (Innovation Period)

② Green Innovation Fund Project Development Content

- Carbon Recycling Blast Furnace Development Progress
- Hydrogen Direct Reduction Method Development Progress

③ Challenge to Carbon Neutrality

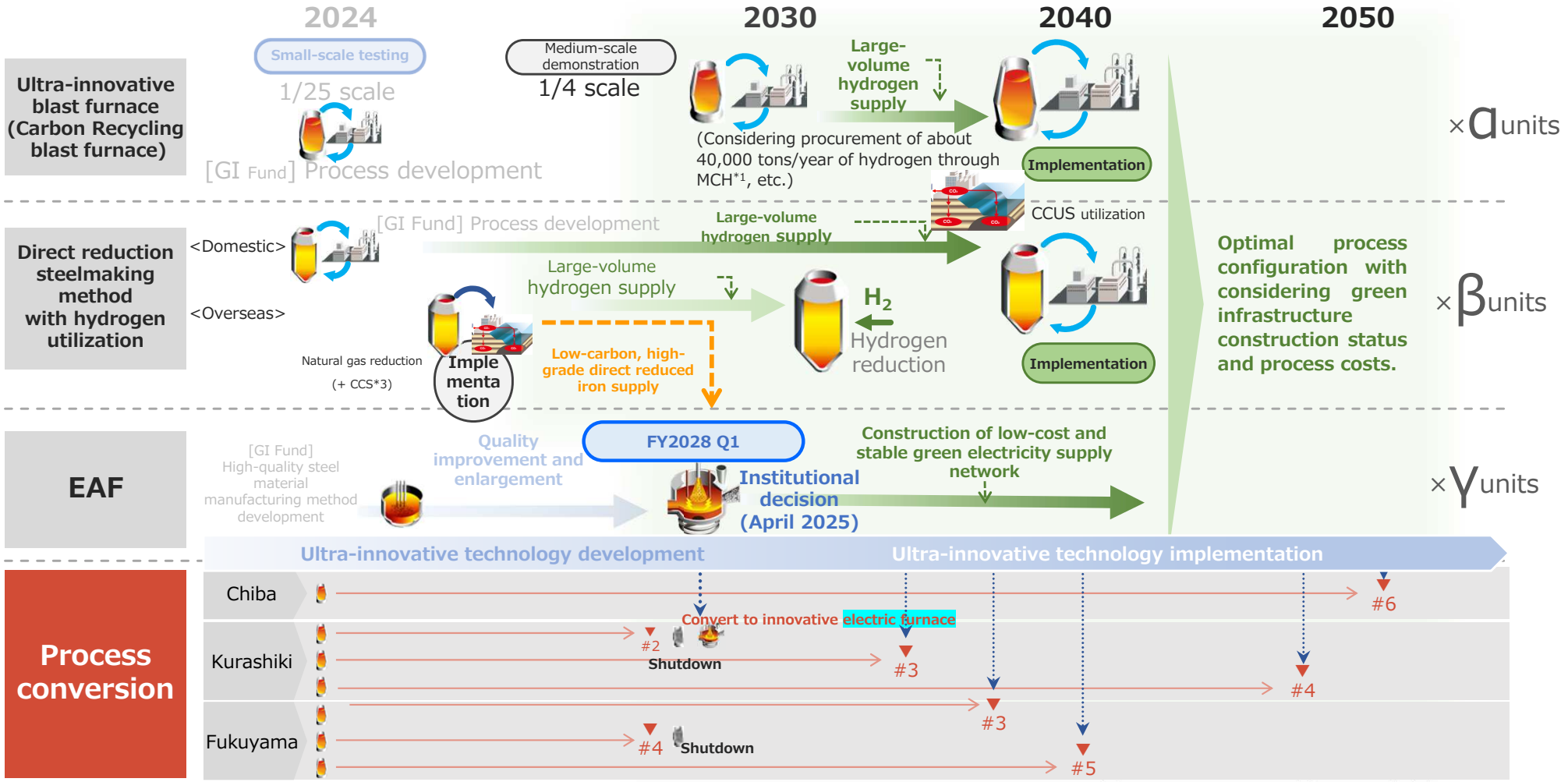
- Necessity of Power Infrastructure Development
- Initiatives toward Hydrogen Procurement
- CCS Initiatives
- Initiatives for CCU Demonstration

④ For Realization of JFE 2035 Vision

- Initiatives for Creating GX Product Markets
- Establishing Predictability for Promoting GX Investment

Direction of Process Transformation (Innovation Period)

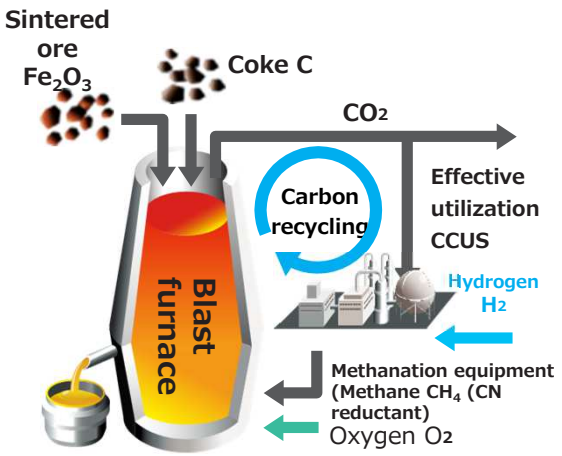
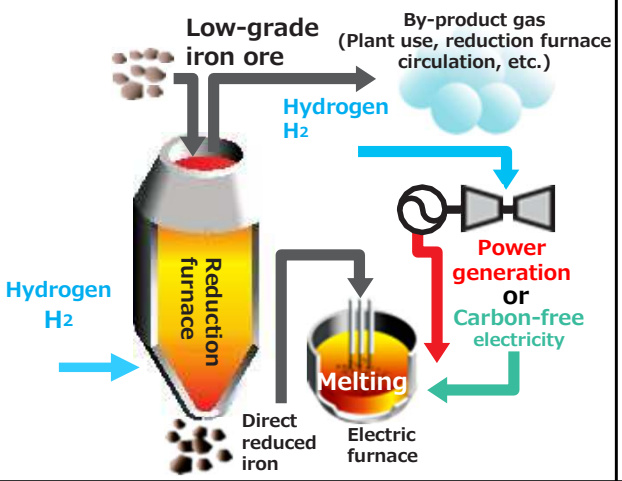
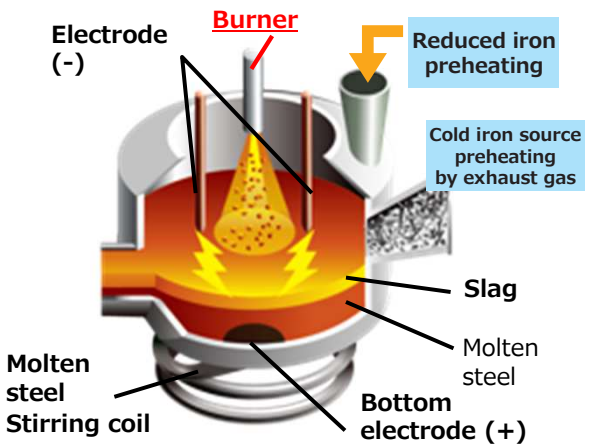
- In the GI Fund project, we have started small-scale testing of hydrogen utilization technology in ultra-innovative blast furnaces and direct reduction steelmaking methods.
- Among them, we consider it is possible to implement innovative EAF early on, we have made an institutional decision to convert the process of Kurashiki No.2 blast furnace, that renovation is scheduled for FY2028, aiming for GHG emission reduction and business growth.
- Process conversion from FY2030 onward will be comprehensively judged and planned considering the construction of low-cost, stable, and large-volume supply networks for hydrogen and electricity, demand for green steel materials, and other factors.



Green Innovation Fund Project Development Content

- In the GI Fund project "NEDO* Hydrogen Utilization Project in Steel Manufacturing Processes," we have built test facilities concentrated in the Chiba district and started test operation of all facilities.

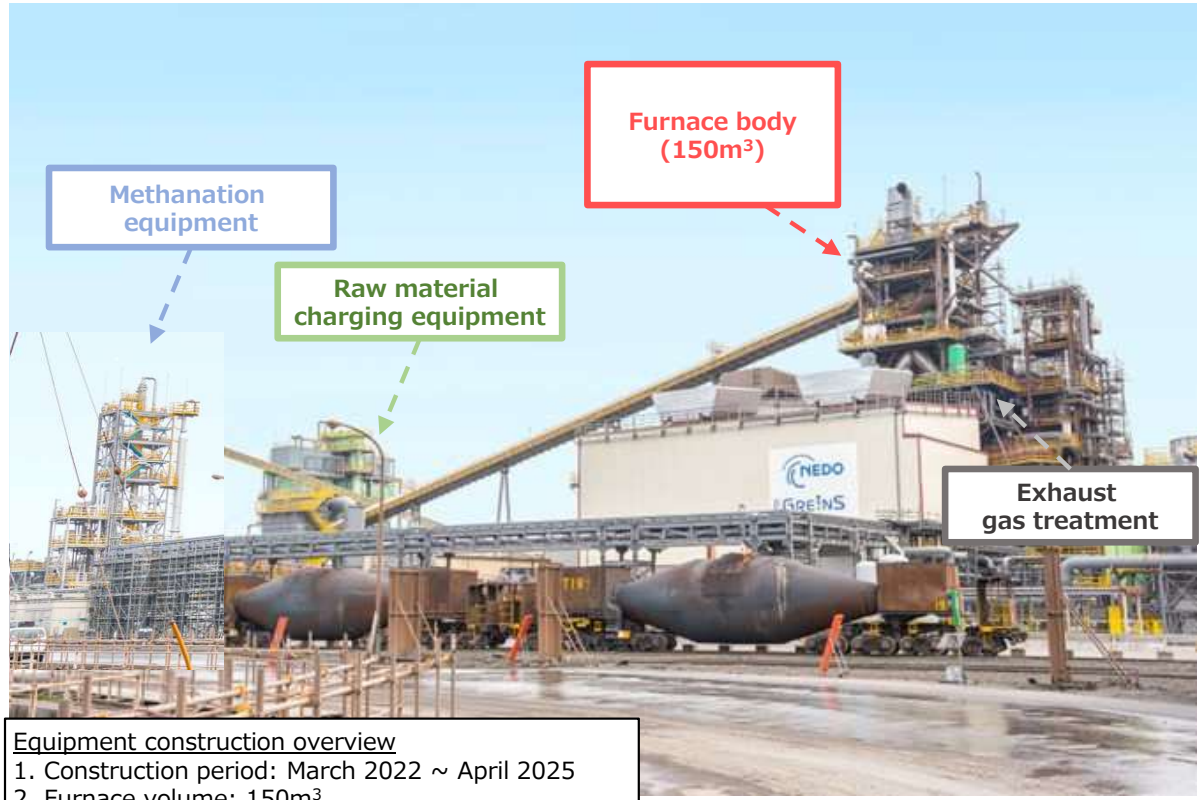
  ＊NEDO（New Energy and Industrial Technology Development Organization）
- Accelerating ultra-innovative technology development to complete carbon neutral technology development in steel manufacturing processes by around 2035 and establish technical prospects.

	①Ultra-innovative blast furnace (Carbon recycling blast furnace process)	②Direct reduction steelmaking process	③High-efficiency, large electric furnace
Development items			
Targets	50% or more CO_2 reduction (vs. conventional blast furnace)	50% or more CO_2 reduction (vs. conventional blast furnace)	Establish high-quality and high-efficiency melting technology
Content	• Oxygen and methane large-volume injection technology • Blast furnace-methanation equipment coordinated operation technology development	• Hydrogen reduction reaction heat compensation (High-temperature hydrogen and regenerated methane injection) • Reductant gas injection condition optimization, according to raw material grade.	• Enhance melting steel quality through hydrogen-based gas denitrification promotion, over-oxidation suppression dephosphorization. • High-efficiency melting methodology through using burner lance, preheating reduced-iron and stirring molten steel.
Period	Operation start May 2025 ~ FY2026	Operation start December 2024 ~ FY2026	Operation start February 2025 ~ FY2025

Carbon Recycling Blast Furnace Development Progress

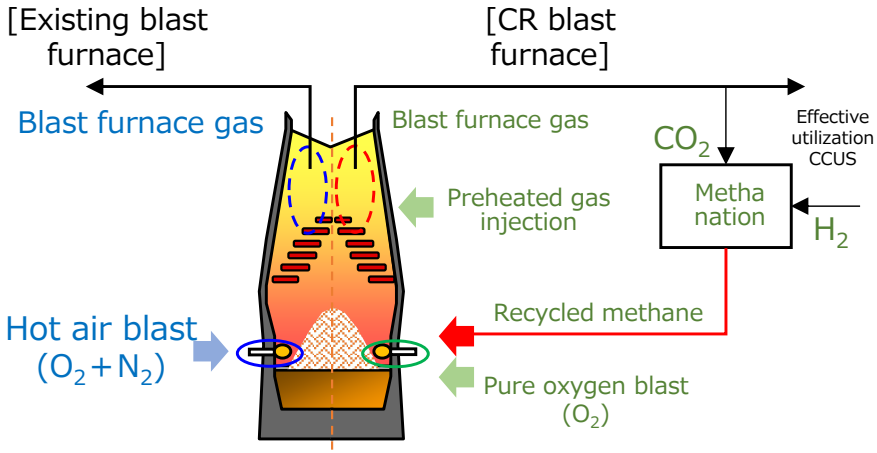
- Built a small-scale carbon recycling test blast furnace (150m^3 scale) at East Japan Works Chiba District. initial kindling completed on May 19, 2025, and operation started.
- We will establish carbon recycling technology (oxygen blast furnace and blast furnace-methanation equipment coordinated operation) and promote studies toward scale-up (700m^3 demonstration furnace, etc.) after stage gate.

Test plant exterior view



Equipment construction overview
1. Construction period: March 2022 ~ April 2025
2. Furnace volume: 150m^3
3. Construction scope
   Furnace body, raw material charging device, exhaust gas treatment equipment, methanation equipment, etc.
4. Experimental period: FY2025-26 (continuous day and night)

Carbon recycling blast furnace technical challenges



- **In existing blast furnaces, coke is burned with heated air to generate high-temperature reducing gas for reduction and melting.**
- **In CR blast furnace, coke is reduced through recycled methane for aiming to maximize methane use and combustion, by nitrogen removed pure oxygen supply. There are many technical challenges that furnace gas reduction and decline raw material heating capacity and those need countermeasure furthermore further expansion of furnace volume.**
- **Scaling up the methanation process and coordinated operation with blast furnace operation are also challenges.**

Hydrogen Direct Reduction Method Development Progress

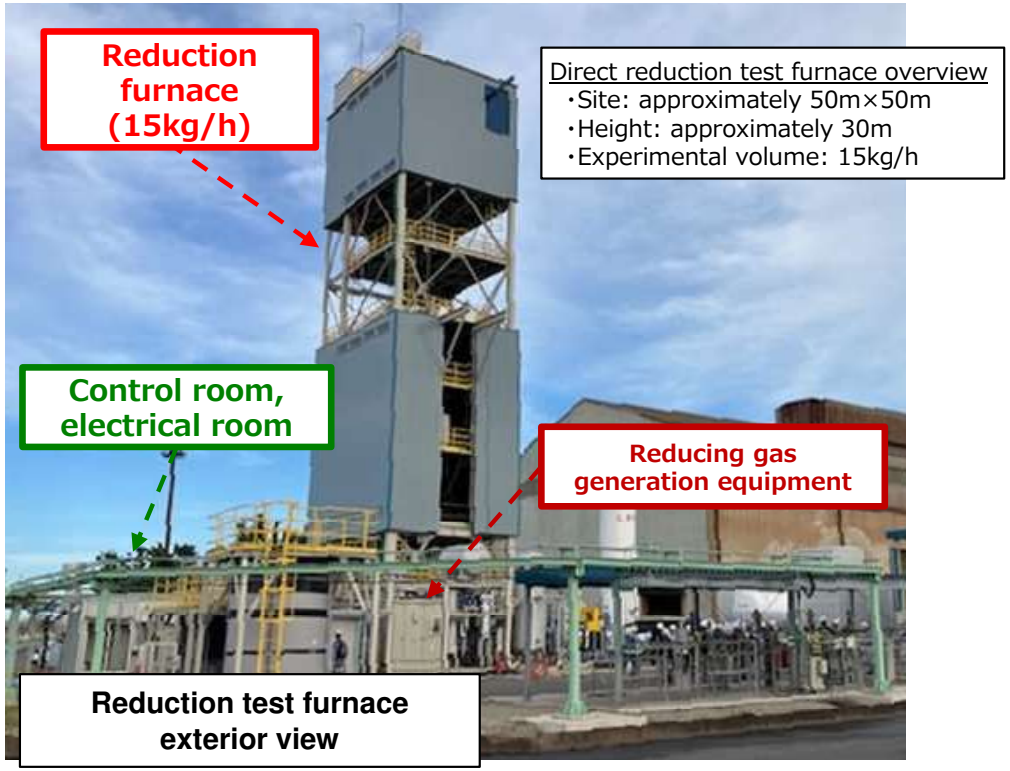
- Built a bench size test furnace (experimental volume 15kg/h) at East Japan Works Chiba District and started operation in December 2024. Successfully achieved continuous reduced-iron production using 100% hydrogen with low-grade pellets.
- Toward the FY2026 stage gate, we will identify optimal reduction conditions for each low-grade raw material property and promote development of hydrogen direct reduction methods utilizing carbon recycling technology.

Pellets after 100% hydrogen reduction test

Raw material pellets
Reduction rate 0%
Brown

Reduced pellets
Reduction rate > 90%
Gray, metallic luster

Test plant exterior view

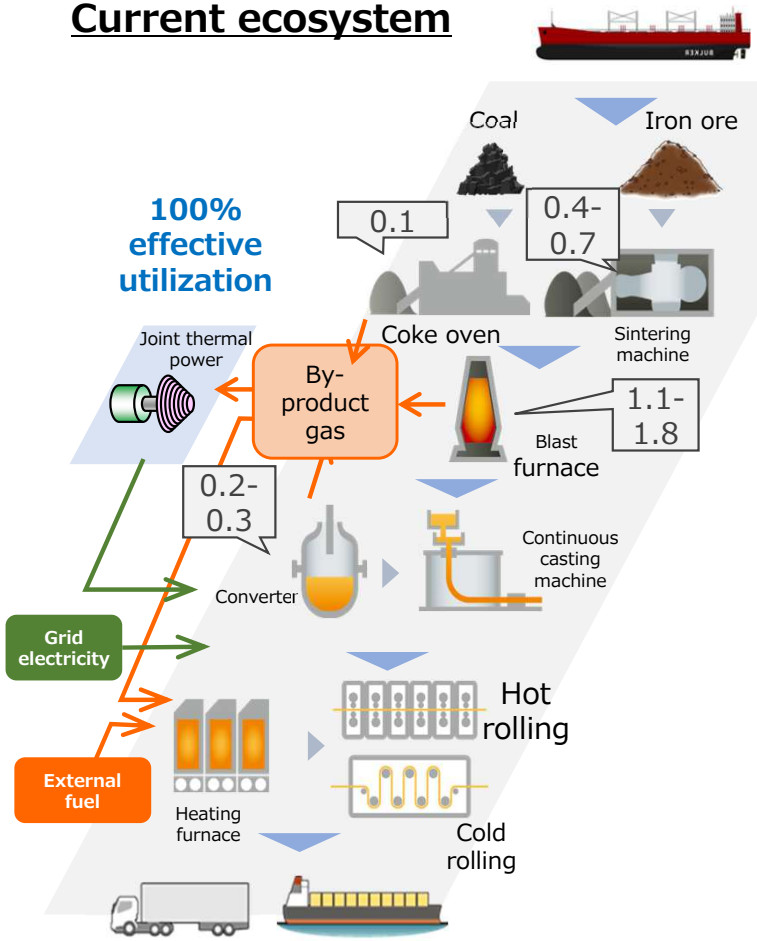


- **Conducting tests with various hydrogen/CO gas ratios to investigate reduced pellet properties (reduction rate, powder rate)**
- **Evaluating optimal conditions for reducing gas composition (hydrogen, recycled methane, etc.) corresponding to raw material quality degradation**

Challenge for Carbon Neutrality

- In steel manufacturing processes, by-product gases generated during production processes are used as fuel for steel heating and in-house power generation, as well as energy supplied to society, achieving 100% effective utilization and building a complete ecosystem.
- The transition to innovative processes that accompanies decarbonization in the steel industry is a challenging initiative that requires the procurement of vast amounts of external energy.

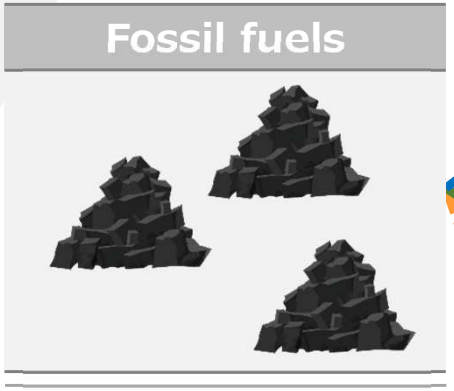
Current ecosystem



*Numbers in diagram represent GHG emission intensity for each process (t-CO_2/t)

Non-fossil energy equivalent to fossil fuels required for carbon neutrality

(When achieving carbon neutrality through one method)



FY2023 input resources	
Crude steel production	23.45 million tons
Coal	**17.5 million tons**
Purchased energy (fossil fuels)	20.0 PJ
Electricity	99 PJ
GHG emissions	**50.4 million tons**

Complete conversion

Hydrogen conversion

5.5 million tons/year

1/4 of government procurement target for FY2050

Complete conversion

Power conversion

7.6 GW

Equivalent to 8 nuclear power plants

When continuing use of fossil fuels and achieving reduction through CCS utilization

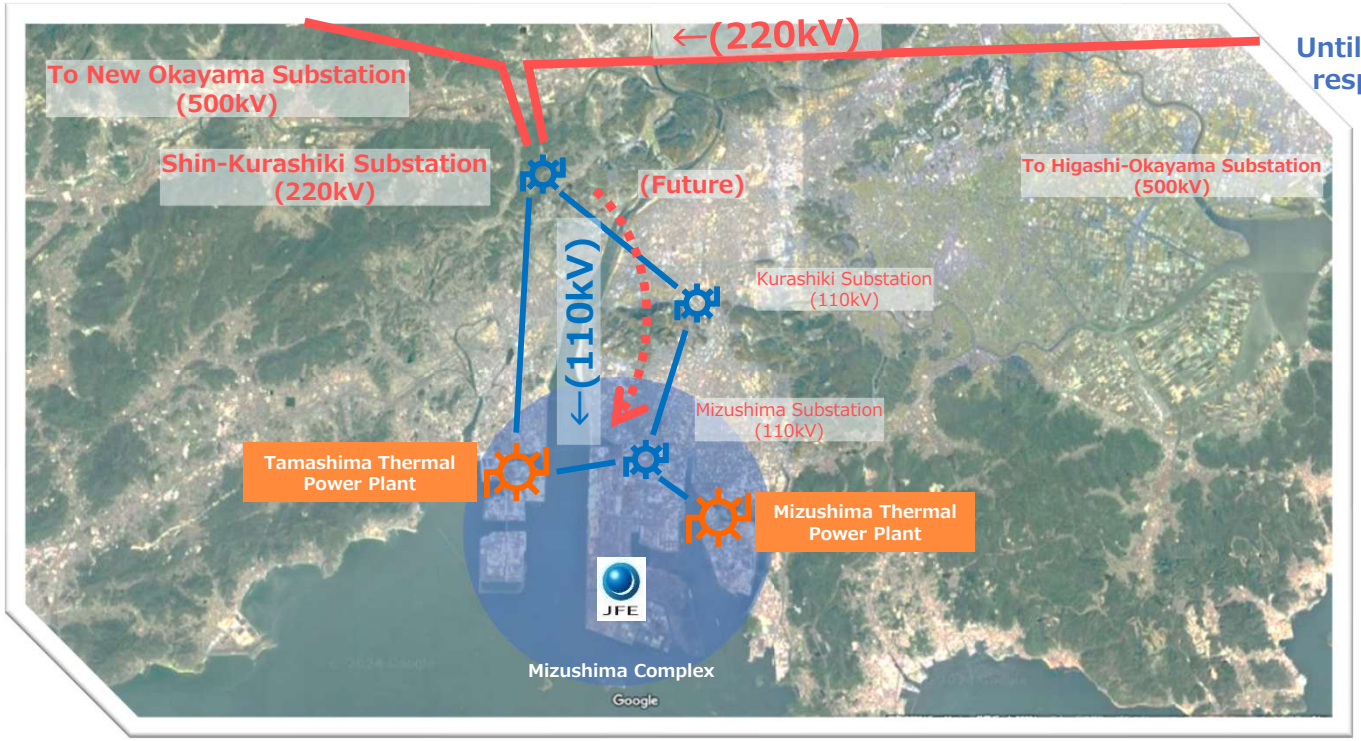
Fixation (CCS)

Electricity: 1.6 GW
Hydrogen: 2 million tons/year

(Energy required for separation, recovery, and liquefaction)

Necessity of Power Infrastructure Development (Case Study: Mizushima Complex Power Grid Challenges)

- Process conversion to innovative EAF in the Kurashiki district will bring significant increase in power demand. While it is necessary to compensate for the reduction in by-product gas from blast furnace processes that has been an energy source up to now, and stable power sources equivalent to 0.5 nuclear plant are need for electric furnace operation. In the future, power requirement potentially exceeding one nuclear power plant and need more power system reinforcement.
- The Mizushima Complex power grid was constructed in the 1960s with the premise of local production and consumption of electricity generated by oil-fired thermal power plants and private power generation facilities within the complex, with surplus power transmitted outside the complex. Large-volume power supply from outside the complex has not been anticipated, and the transmission network is vulnerable to increased power demand for carbon neutrality and utilization of decarbonized electricity from outside the complex.
- Thus, while large-scale infrastructure reinforcement is necessary to meet carbon neutrality demand such as decarbonization of steel processes, uncertainty in regional power demand increases and cost burden allocation are challenges, making it difficult for both demand and supply sides to make decisions on massive equipment investment now.



Until innovative electric furnace introduction in 2028, respond with existing 110kV system reinforcement

Looking ahead to power demand increases from 2030 onward, new 220kV system installation is necessary

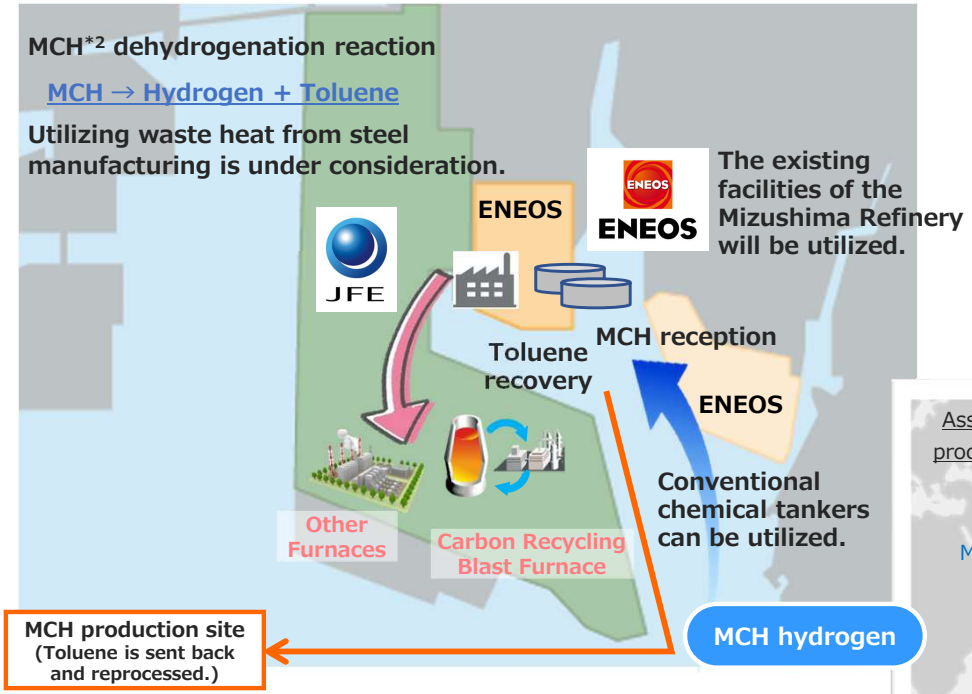
Mizushima Complex Companies
- Asahi Kasei Corporation Production Center, Mizushima Works
- Kuraray Co., Ltd. Kurashiki Plant
- ENEOS Corporation Mizushima Refinery
- Chugoku Electric Power Co Inc Mizushima Power Station, Tamashima Power Station
- Mitsubishi Gas Chemical Co Inc Mizushima Plant
- Mitsubishi Chemical Corporation Okayama Plant
- Mitsubishi Motors Corporation Mizushima Plant, and others

Source: 56th Comprehensive Resource and Energy Survey Basic Policy Subcommittee

Initiatives toward Hydrogen Procurement

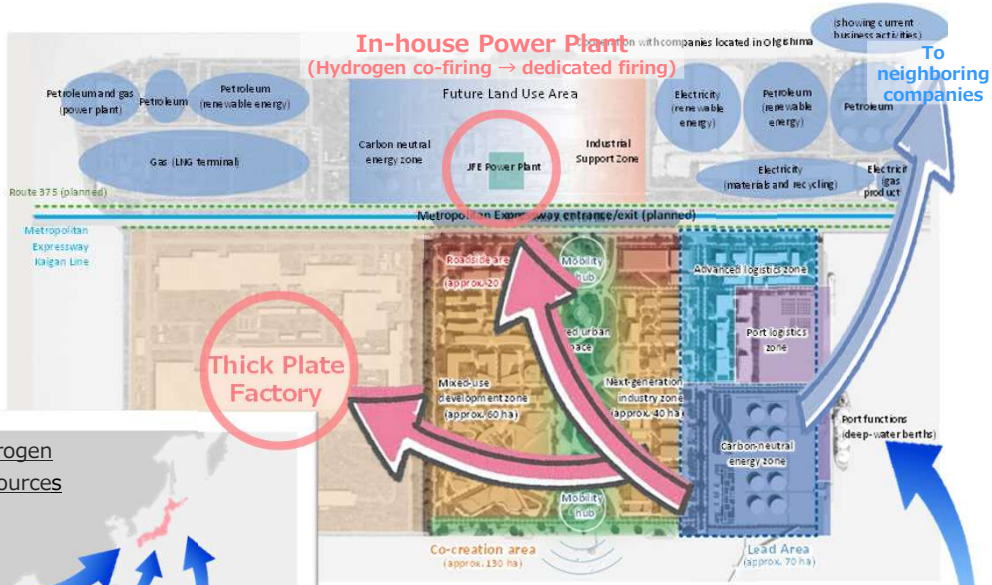
- While there are several hydrogen carriers, we aim to build a hydrogen supply chain by 2030 and promote initiatives to procure hydrogen utilizing the locations of the East and West Japan Works.
- At the West Japan Works (Kurashiki), we are moving forward with plans to procure MCH hydrogen using adjacent existing facilities operated by ENEOS Corporation for a medium-scale demonstration carbon recycling blast furnace and the utilization of 40,000 tons/year of hydrogen as decarbonized fuel.
- At the East Japan Works (Keihin), we are promoting the construction of a base to serve as a hub for establishing large-scale marine transportation technology for liquefied hydrogen that leverages port functions. Along with supplying hydrogen to neighboring companies, we plan to utilize up to 8,000 tons/year of hydrogen as an LNG fuel alternative (hydrogen co-firing) for our own power plant and thick plate factory.
- In order to achieve carbon neutrality, infrastructure that can supply green hydrogen stably and affordably at more than 100 times the current plan is necessary.

Hydrogen utilization at the Mizushima Complex



*2 MCH (Methylcyclohexane):
One type of hydrogen carrier, a liquid made by adding hydrogen to toluene

OHGISHIMA2050 (Aiming for a Carbon Neutral City)



*1 National Research and Development Agency New Energy and Industrial Technology Development Organization (NEDO)
Green Innovation Fund Project
"Commercial demonstration of Liquefied Hydrogen Supply Chain"

CCS Initiatives

- We have concluded a consignment contract with JOGMEC regarding “Engineering Design Work for Advanced CCS Projects” and are also independently promoting studies on the installation of CO_2 separation, capture, liquefaction, temporary storage, and shipping facilities.
- This fiscal year, front end engineering design (FEED) work will start. We are proceeding with studies toward the realization of EPC and beyond, assuming government support, aiming to start CCS by the end of the 2020s.
- For final investment decisions, the concrete government support for CAPEX and long-term OPEX is necessary.

Advanced CCS	Kurashiki: Offshore Sarawak CCS (Malaysia CCS Project)		
Transportation/ Storage Destination	Malaysia	JFE’s Capture Volume	**1.3** million tons-CO_2/year

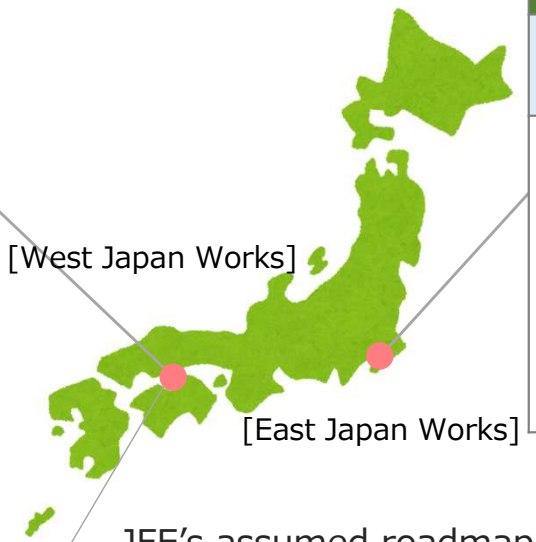
JAPEX, JGC, K LINE, PETRONAS, JFE, MITSUBISHI GAS CHEMICAL, MITSUBISHI CHEMICAL GROUP MITSUBISHI CHEMICAL, Energia THE CHUGOKU ELECTRIC POWER CO., INC., NGL NIPPON GAS LINE

Advanced CCS	Chiba: Northern Offshore of Peninsular Malaysia CCS		
Transportation/ Storage Destination	Malaysia	JFE’s Capture Volume	**0.7** million tons-CO_2/year

Mitsubishi Corporation, ENEOS, ENEOS Xplora, JFE, COSMO, NIPPON SHOKUBAI, PETRONAS

Independent FS	Fukuyama: Setouchi / Shikoku CO_2 Hub Concept		
Transportation/ Storage Destination	Australia	JFE’s Capture Volume	**0.7** million tons-CO_2/year

Sumitomo Corporation, JFE, SUMITOMO OSAKA CEMENT CO., LTD., K LINE



JFE’s assumed roadmap (Fiscal year)

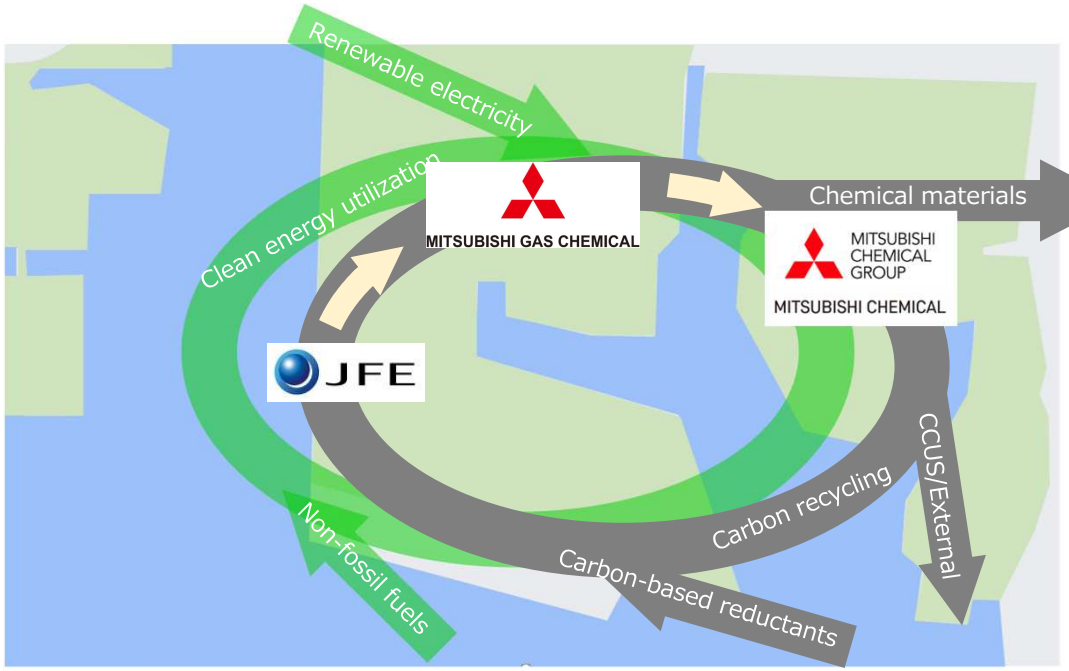
	2024	2025	2026	2027	2028	2029	2030	2031 onwards
Kurashiki	Pre-Feed	FEED	☆	EPC				CCS start
Chiba	FS	Pre-Feed/FEED	☆		EPC			CCS start
Fukuyama	FS	Pre-Feed/FEED		☆				

※ For final investment decisions, the concrete government support is necessary (☆)

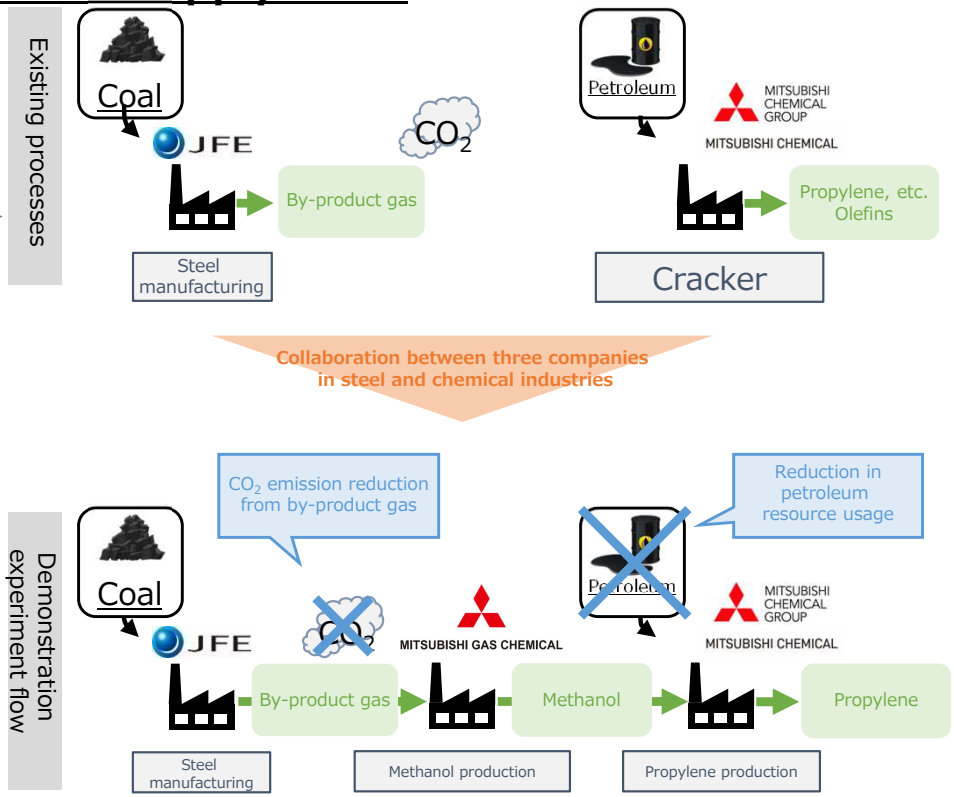
Initiatives for CCU Demonstration

- At the West Japan Works (Kurashiki), leveraging the location of the Mizushima Complex (Kurashiki City, Okayama Prefecture) where steel and chemical facilities are adjacent, we have started demonstration experiments to effectively utilize CO_2 generated from steel processes and manufacture chemicals through inter-company collaboration with Mitsubishi Gas Chemical Co Inc and Mitsubishi Chemical Group Corporation.
- This is a new initiative where Hard to Abate industries (industries where CO_2 emission reduction is difficult) collaborate, and by developing it into a carbon circulation concept through collaboration between the steel and chemical industries, we aim to significantly reduce GHG emissions compared to conventional chemical manufacturing methods using chemical resources.

Carbon circulation concept through cross-industry collaboration

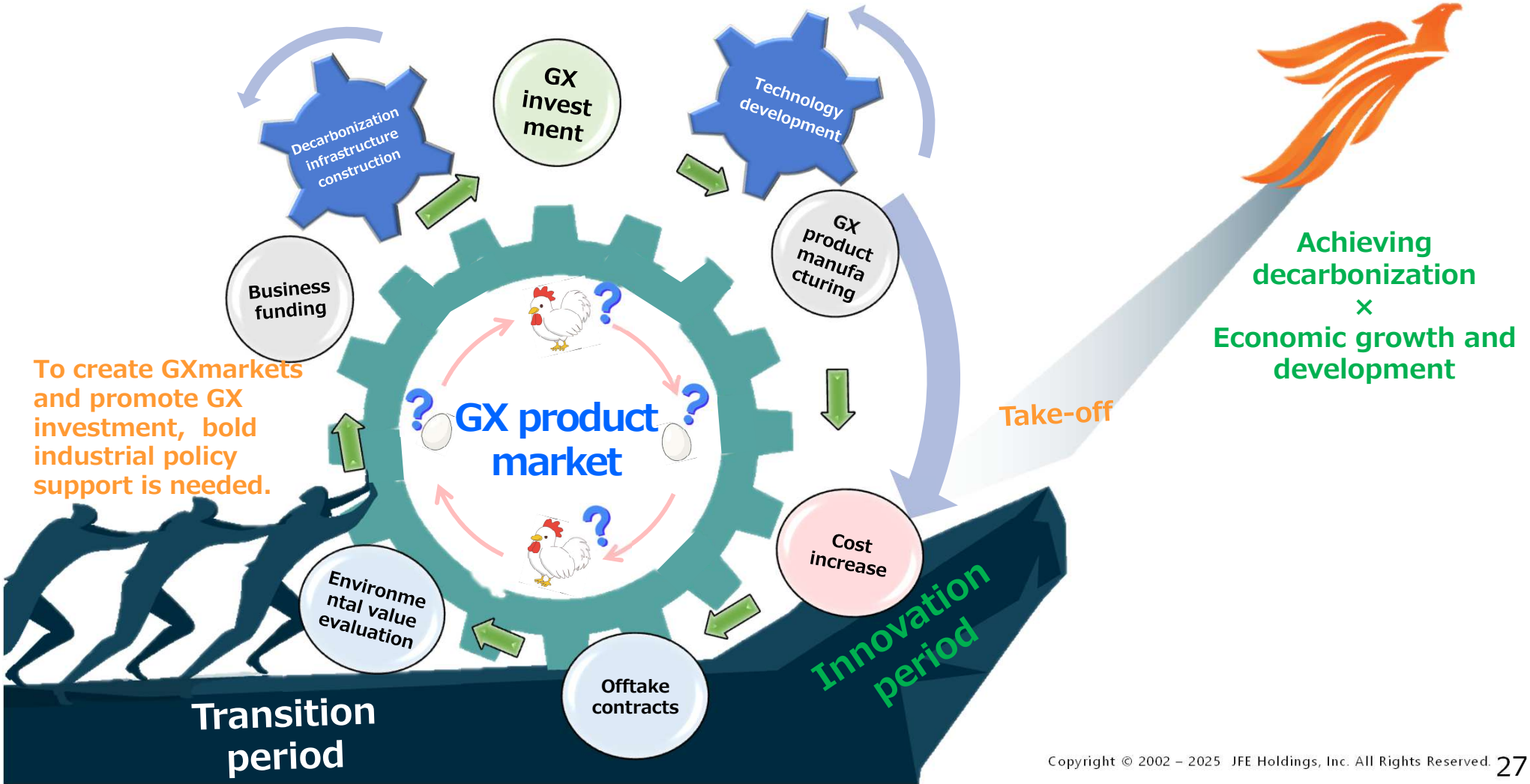


Emission reduction effects across the entire supply chain



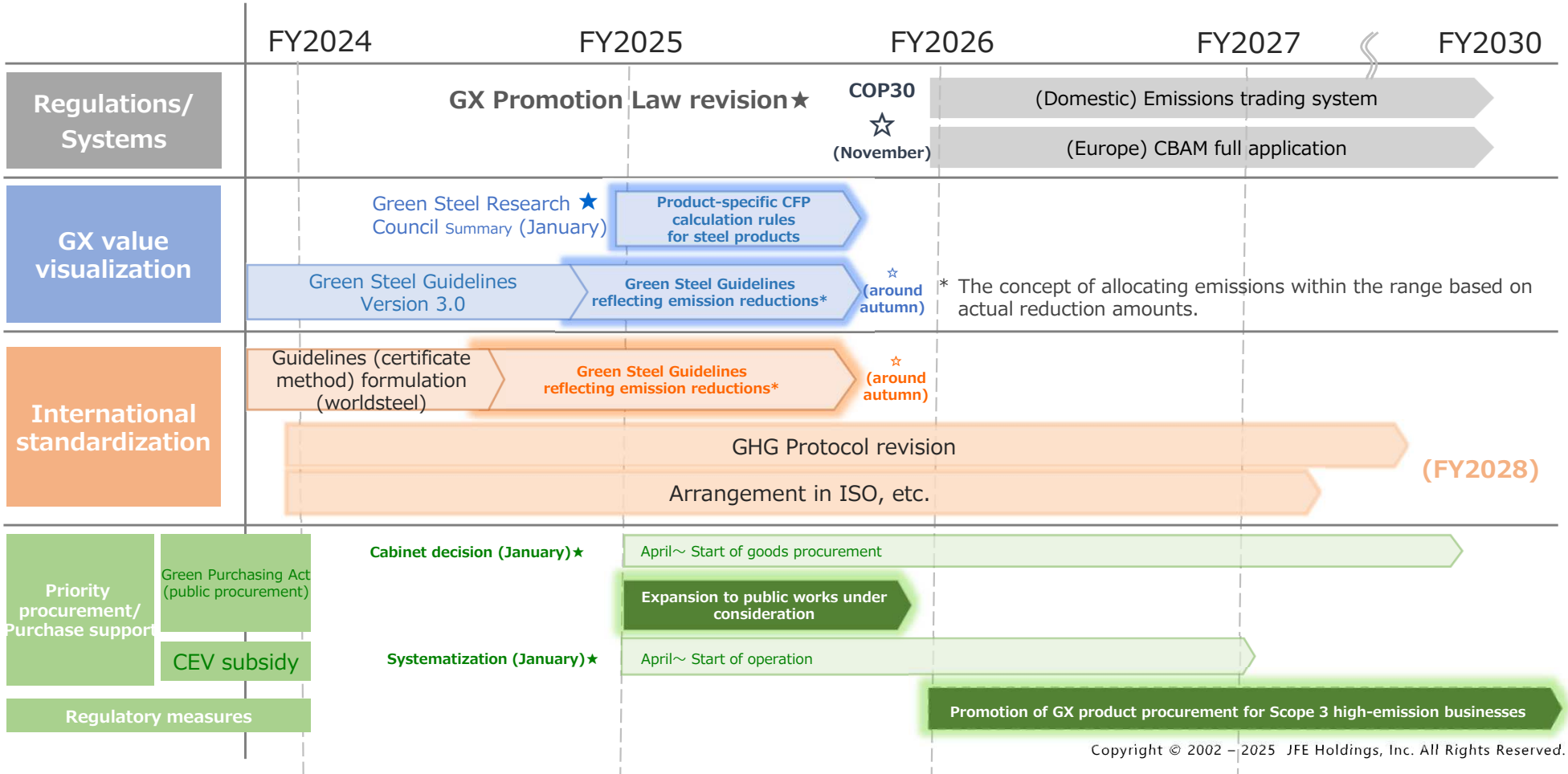
For Realization of JFE Vision 2035

- In the innovation period, to implement of novel technologies requires long-term technology development and to construct and equip of large-scale decarbonization infrastructure.
- GX product demand cannot be expected to appear autonomously, and on both the supply and demand sides, it is difficult to make decisions about massive capital investments and full-scale GX product procurement.
- To achieve decarbonization and economic growth, bold industrial policy support is needed to create demand for GX products and promote investment.



Initiatives for Creating GX Product Markets

- To promote GX, it is important to promote understanding of how to assess the value of GHG reductions in the supply chain. In FY2025, for reflecting the value of GHG reduction to customers' product CFP, we will accelerate our efforts to visualize GX value and create international standards.
- Additionally to create GX product market policy support is required. In the "Green Steel Research Council for GX Promotion" hosted by METI, we proposed the necessity of creating demand for green steel and necessary policy support, shared the necessity of early action for market creation, as a result government priority procurement and purchase support measures have been realized.
- To create further demand, we are promoting the use of green steel for public procurement (public works) and creating demand in the private sector through initiatives such as “GX Leading Action Declarations.”



Establishing Predictability for Promoting GX Investment

- Decarbonization is a common global need, and "GX" is an opportunity for Japan's economy to recover from the "lost 30 years" when domestic investment stagnated.
- For Japan to become a frontrunner in GX and improve innovative technologies to domestic investment, it is important to enhance the predictability of the business environment.
- To achieve this, in addition to continuous support for the development and implementation of innovative technologies, comprehensive public-private efforts are needed to address various issues related to energy and infrastructure development.
- JFE has formulated "JFE Vision 2035" and considers investment in GX to be growth strategy investment as a leading company helping society progress for carbon neutrality. JFE will steadily advance steel process decarbonization measures to achieve emission reductions and business growth.

1. Long-term government support that does not fall behind the support from Europe, America, and China for massive research and development costs and enormous capital investment costs
2. Long-term government support for increases in operation costs such as conversion to innovative processes and non-fossil raw materials and fuels, and electricity
3. Development and reconstruction of transmission infrastructure for the increase in electricity demand as society progresses toward decarbonization. (Not only regional interconnection lines but also local backbone systems)
4. Securing stable supply systems for decarbonized power sources and realizing internationally competitive industrial decarbonized electricity prices (Including safe utilization of nuclear power)
5. Construction of hydrogen and ammonia supply chains that will serve as new decarbonized fuel infrastructure

   (Low-carbon hydrogen supply chain and Stable LNG supply that can serve as transition fuel)
6. Establishing support systems for promoting CCUS (CAPEX/OPEX)

IV. GHG Emission Reduction Contribution Initiatives in Engineering Business

Initiatives for offshore wind power generation projects

GHG Emission Reduction Contribution Initiatives in Engineering Business

- Contributing to the realization of a decarbonized society by expanding GHG reduction contribution through business
- Expanding reduction contribution centered on WtR/CN fields*, aiming for 30 million tons in FY2035

Engineering business GHG reduction contribution expansion plan

Waste-to-energy power generation (Izumo)

12 million tons

(Fiscal year) 2024 (Results)

Biomass power generation (Tahara)

13.5 million tons

2027

Overseas Waste-to-energy power generation

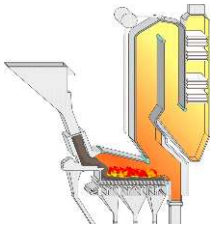
Offshore wind power generation (Nyuzen)

Offshore wind monopile foundation manufacturing

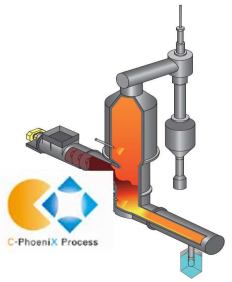
20 million tons

2030

NH_3/H_2, CCUS expansion



CO_2 recovery from waste



Waste-to-Chemical

30 million tons

2035

* WtR (Waste to Resource): Waste power generation/recycling business, etc.
CN (Carbon Neutral): Related businesses such as renewable energy generation

Initiatives for offshore wind power generation projects

- Japan's first monopile manufacturing factory for offshore wind turbine (Kasaoka city) began operation (April 2024)
- **Established manufacturing methods** based on history of welding technology (full-scale prototype is currently being produced)
- Planning to take in domestic projects and start full-scale manufacturing from the second half of 2025
- **Contributing to the expansion of renewable energy by leveraging the JFE Group's comprehensive capabilities**

JFE Engineering

- Enhanced monopile steel manufacturing equipment (November 2023 operation)
- Capable of manufacturing heavy plates for Asia's largest class offshore wind

Steel supply

JFE Steel

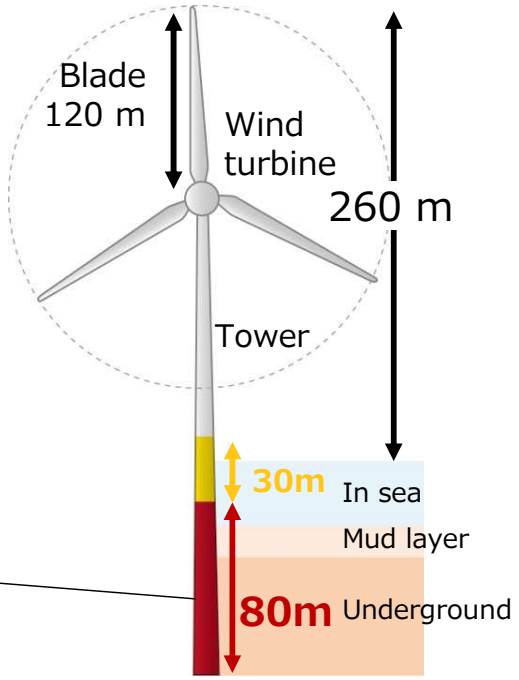
JFE Shoji

SCM* Support

Monopile (prototype)

(Diameter approximately 10 m, length 60 m, weight 1,000 t scale)

- Image diagram of bottom-fixed foundation type offshore wind power generation (Approximate size of main 15 MW class)



*Supply Chain Management

2. Initiatives for Transition to Circular Economy

I. JFE Group's Basic Policy for Transition to Circular Economy

II. Initiatives for Transition to Circular Economy in Engineering Business

III. Initiatives for Transition to Circular Economy in Steel Business

I. JFE Group's Basic Policy for Transition to Circular Economy

- Toward realizing a circular society -

➢ **The circular economy is essential for realizing a sustainable society**

We have established initiatives for realizing the circular economy as an important issue in JFE Group's Eighth Medium-term Business Plan, and are promoting them through collaboration with value chains beyond the group framework

Main initiatives

Converting by-products/waste to resources

- **ST** Utilization of resources such as slag and dust, promoting utilization of plastic waste
- **EN** Expanding business locations for Waste-to-Energy, plastic recycling, food recycling, and other related operations

Developing eco-products/solution technologies with high resource efficiency

- **ST** Expanding eco-products such as electrical steel sheets and high-tensile steel
- **EN** Strengthening initiatives for infrastructure resilience and longevity

Expanding utilization and sales of recycled resources

- **ST** **SH** Expanding iron scrap collection and use
- **ST** Expanding sales of steel slag products for marine use
- **SH** Strengthening procurement of environmental materials such as waste tires

ST Steel business
EN Engineering business
SH Trading business

Also contributing to climate change issues and biodiversity conservation

II. Initiatives for Transition to Circular Economy in Engineering Business

- Basic Policy for Initiatives
- Resource circulation: Value chain construction

  ①Waste plastic recycling

  ②Horizontal recycling of PET bottles

  ③Food recycling

  ④Waste-to-Chemical
- Decarbonization: Regional new electricity development
- Infrastructure longevity: Bridge reconstruction projects

Basic Policy for Initiatives in the Transition to Circular Economy within Engineering Business

- **Providing a wide range of infrastructure and services that contribute to the transition to a circular economy** from infrastructure construction and operation to recycling, contributing to society
- Promoting multifaceted initiatives by leveraging the characteristics of having a **diverse business portfolio**

Resource circulation

Decarbonization

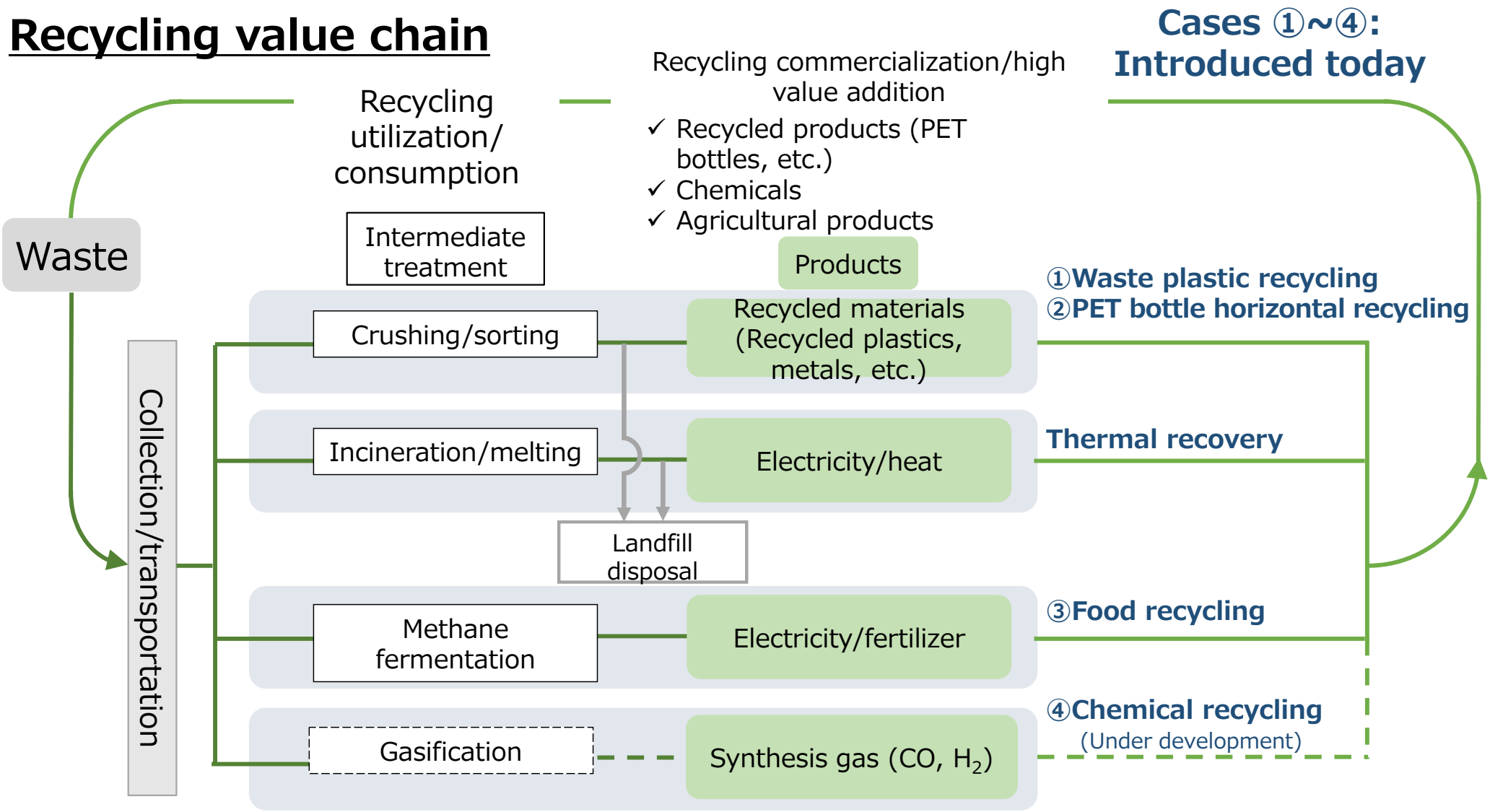
Infrastructure longevity

	2025	2030	2035
Resource circulation	Recycling value chain construction	Expansion	
			Waste-to-Chemical
Decarbonization	Renewable energy generation/regional new electricity location expansion		
	Offshore wind power generation: Monopile manufacturing		
			Expansion to floating type
Infrastructure longevity	Bridge reconstruction and improvement/ Plant fundamental improvement		

Resource circulation: Construction of recycling value chains

■ As a company able to provide integrated services from waste collection and transportation to intermediate treatment and recycling, we are constructing recycling value chains including collaboration with related companies and local governments.

Recycling value chain

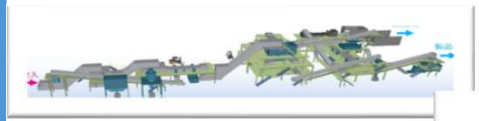


Resource circulation: ①Waste plastic recycling

- Developing business models to expand and re-commercialize municipal waste plastic collection through collaboration with local governments
- Established J Circular System Corporation and installed Japan's largest-scale recycling facility in Kawasaki City, promoting material recycling and chemical recycling of waste plastics (operation in FY2025)

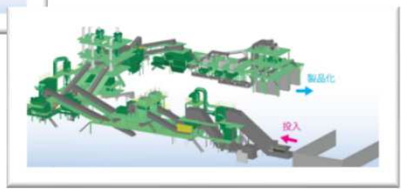
Company overview

Company name	J Circular System Corporation
Established	July 2023
Capital	90 million yen (J&T Recycling Corporation 66%, East Japan Railway Group 34%)
Location	Kawasaki City, Kanagawa Prefecture
Equipment capacity	58,000 tons/year

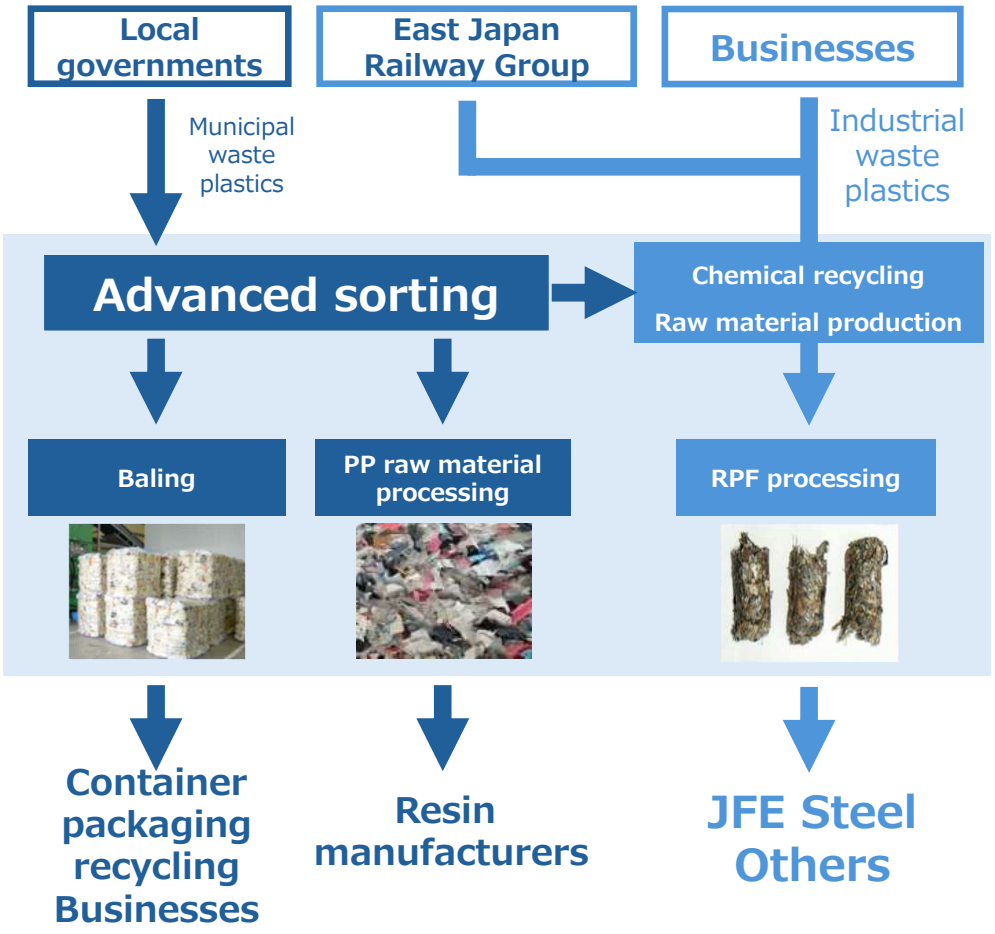


Advanced sorting line

Chemical recycling
Raw material production line



Business scheme



Resource circulation: ②Horizontal recycling of PET bottles

■FY2022: Launched West Japan PET Bottle MR Center, business expanding
■ Processing capacity: 60,000 tons/year (equivalent to about 10% of total shipment bottles nationwide)
■ Compared to PET bottle manufacturing from fossil fuels, CO_2 emissions reduced by 63%[1)]

Business scheme

J&T Recycling Corporation (JFE)
Kyoei Industry Co.,Ltd. (KYOEI)
Seven & i Holdings (SEVEN&i HOLDINGS)

Joint investment

Kyoei J&T Recycling Corporation

Local governments/ businesses

Used PET

Procurement

Reception → Sorting → Crushing → *

Flaking by PET bottle Crushing Label removal

* → Washing → Re-polycondensation

Flake production

Pellet production

Sales

End users

PET bottles

Suntory, Coca-Cola, ITO EN, Asahi Soft Drinks, Mizkan, etc.

100% recycled resin
PET bottle production possible

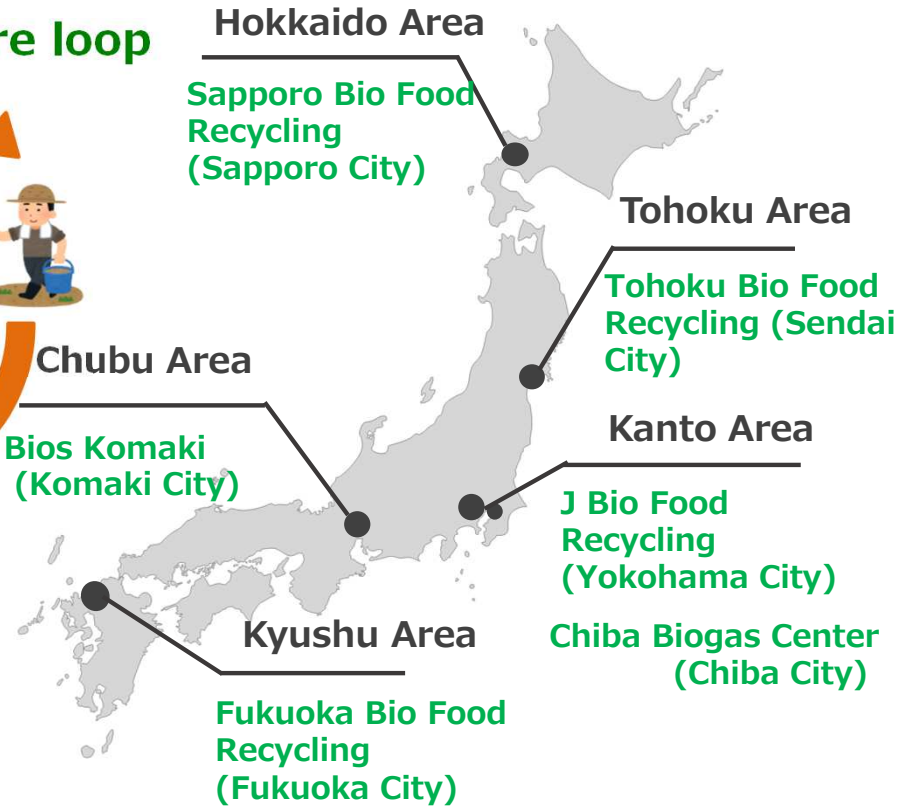
1) Calculated by Mitsubishi UFJ & Consulting based on Kyoei Sangyo published data

Resource circulation: ③Food recycling

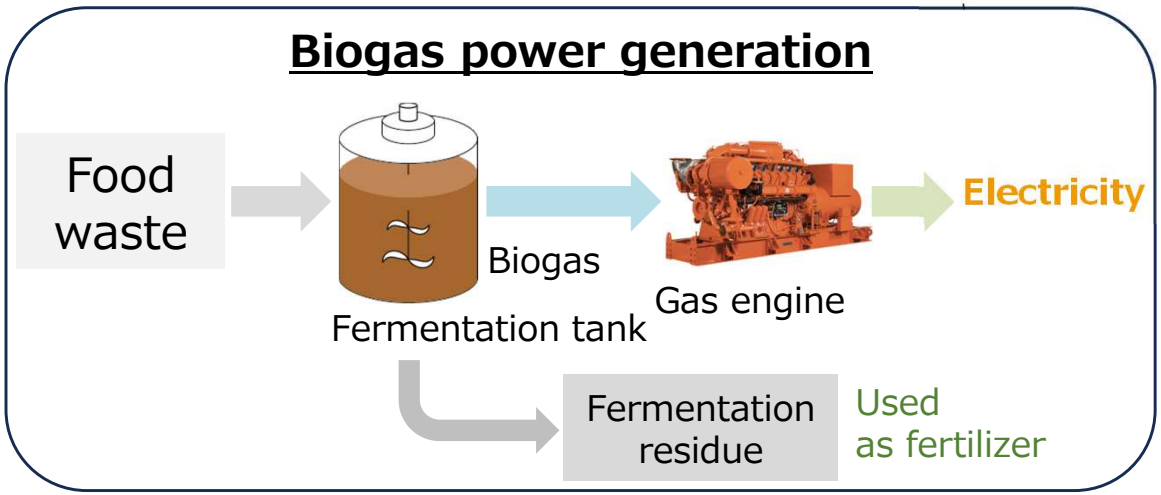
- Converting food waste to electricity and fertilizer, realizing local production and consumption recycling
- Expanding business at six locations nationwide, starting with J Bio Food Recycling (from 2018)

Double loop of food recycling

*1 UEC: Urban Energy Corporation (JFE Group retail electricity business)



Biogas power generation

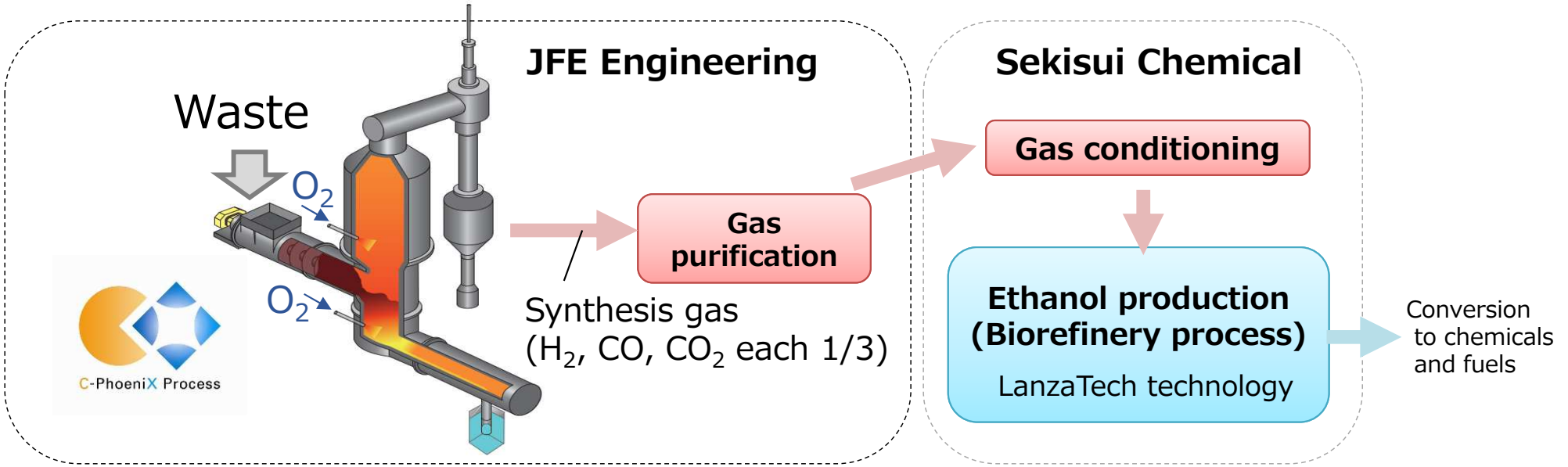


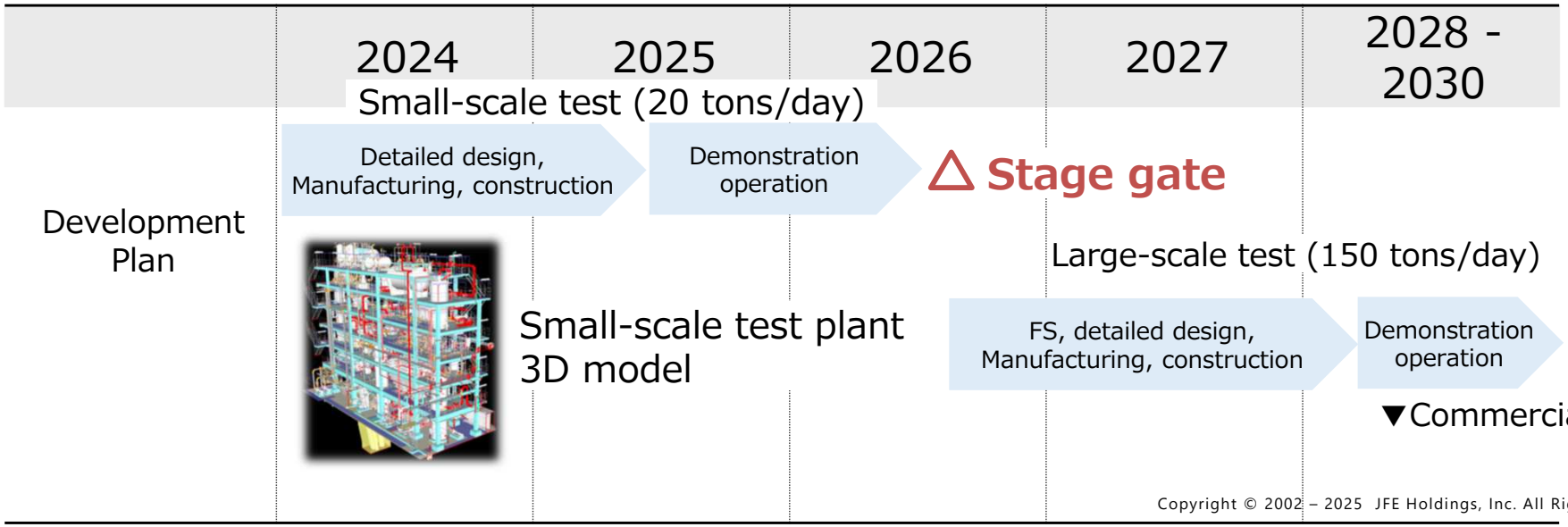
Collaborating with four restaurant companies including Sushiro (up to 2,300 stores) to accelerate power generation from food waste
May 2, 2025 Nikkei Shimbun Morning Edition Front Page

Resource circulation: ④Waste-to-Chemical

- Developing WtC* process which produce green ethanol from synthesis gas made from waste
- Aiming to practical use in society around 2030 with Green Innovation (GI) Fund

* Waste to Chemical: Chemical recycling of waste

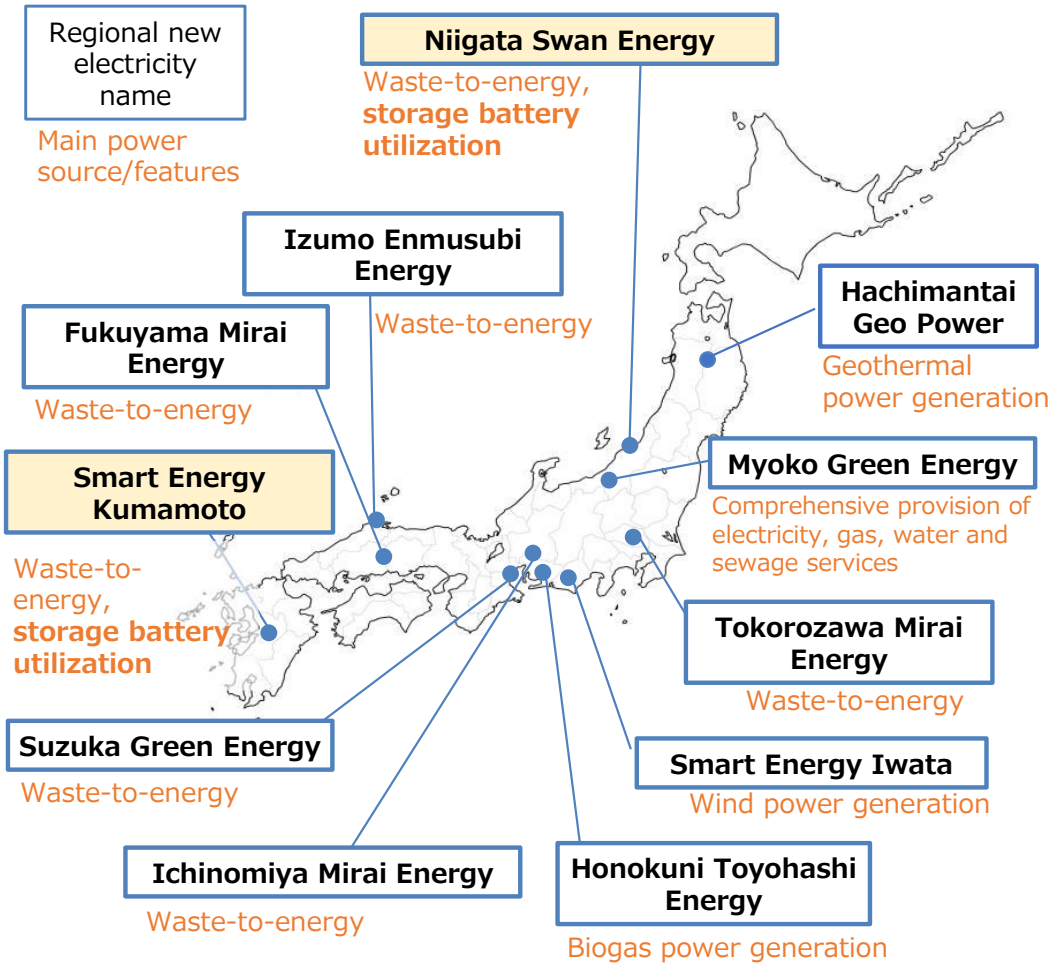




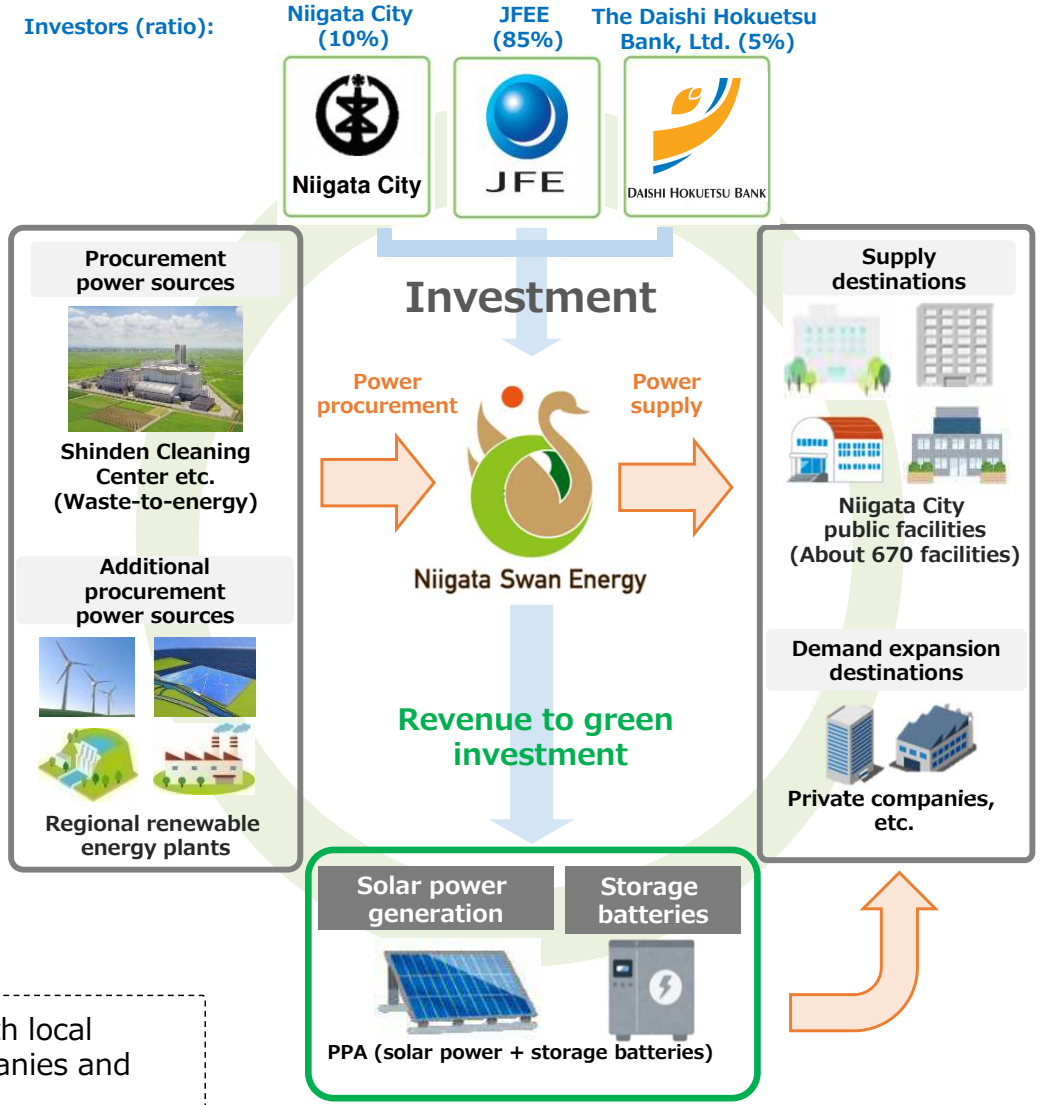
Decarbonization: Regional new electricity development

- Promoting local production and consumption/regional circulation of energy by expanding regional new electricity bases
- Developing businesses utilizing various renewable energy sources combined with storage batteries for adjustment (Niigata, Kumamoto)

Regional new electricity development map



Business overview example (Niigata Swan Energy)



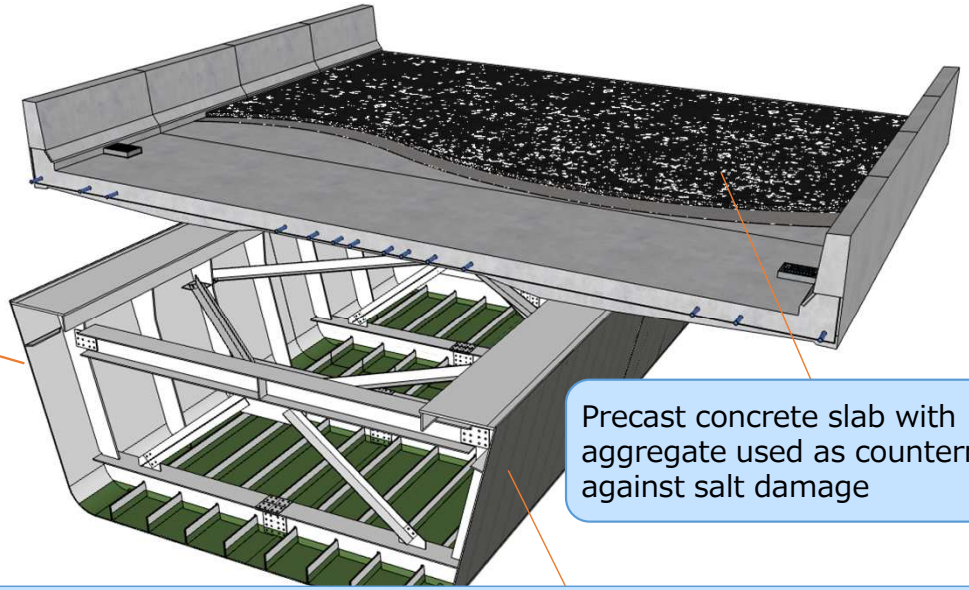
Among regional new electricity companies that are collaborating with local governments, the JFE Group has invested 10% by number of companies and 20% by total electricity sales volume (as of end of April 2024)

Infrastructure longevity: Bridge reconstruction projects

- For infrastructure such as road bridges developed since the high economic growth period, the proportion of facilities that have been in use for more than 50 years since construction is increasing at an accelerating pace *1
- Realizing bridge longevity through advanced engineering

*1 Proportion of bridges in use for more than 50 years
37% (2023) → 54% (2030) → 75% (2040)

Bridge reconstruction project example:
New Tedorigawa Bridge (Ishikawa Prefecture)



Precast concrete slab with limestone aggregate used as countermeasure against salt damage

- Opened in 1972, more than 50 years have passed since construction
- Currently implementing replacement work of concrete bridge deteriorated by salt damage, sand abrasion, etc. with steel bridge using stainless clad steel
  (Scheduled for completion in 2027)

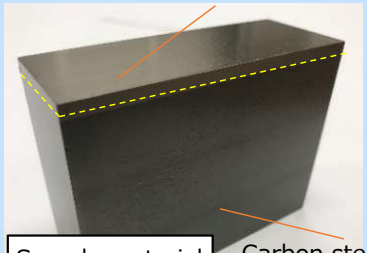
Designed and constructed as a structure with **100-year durability**

First adoption of **stainless clad steel*2 with excellent corrosion resistance and abrasion resistance that realizes infrastructure longevity** for road bridges (salt damage countermeasure/abrasion countermeasure)

*2 Stainless steel and carbon steel joined by hot rolling, JSL310Mo with **excellent seawater resistance** applied to stainless coating (manufactured by JFE Steel)

JSL310Mo: Track record of adoption for ice contact parts of icebreaker (Shirase)

Stainless coating (t=1.5 mm)



III. Initiatives for Transition to Circular Economy in Steel Business

Resource circulation: Expanding applications of steel slag products

Resource circulation: Expanding applications of steel slag products

- Contributing to **natural resource (rock/stone/sand) conservation** by expanding applications of steel slag products as construction materials
- By expanding sales of calcia-modified soil, converting 15-20 million m^3/year of generated **dredged sediment to beneficial materials**

Ground granulated blast furnace slag (blast furnace cement raw material)

- Manufactured by finely grinding granulated blast furnace slag
- **Resource-saving and natural environment conservation** as substitute for Portland cement
- **Energy-saving and low CO_2 emissions** with no firing process required

Advantages of blast furnace cement *In case of blast furnace cement type B

Ground granulated blast furnace slag

Resource saving
Natural resource conservation (Limestone, crushed stone, sand)

Energy saving
Approximately 40% reduction compared to ordinary cement (Fuel, electricity, etc.)

CO_2 reduction
Approximately 40% reduction compared to ordinary cement

Modified from "Environmental Material Steel Slag" by Nippon Slag Association

Steel slag hydrated solidified body (artificial stone, blocks)

- Hydrated solidification with steelmaking slag and ground granulated blast furnace slag as main materials
- Can be manufactured in arbitrary shapes and sizes
- **Substitute for natural stone (~semi-hard stone) and concrete products**

Frontier Rock®

Frontier Stone®

Wave-dissipating blocks

Calcia-modified soil

- Mixing dredged sediment with calcia modifier (steelmaking slag)
- Solidifying and **substituting for natural sand and stone materials** in port and marine construction
- **Reducing burden on** dredged sediment **disposal sites** and extending their lifespan

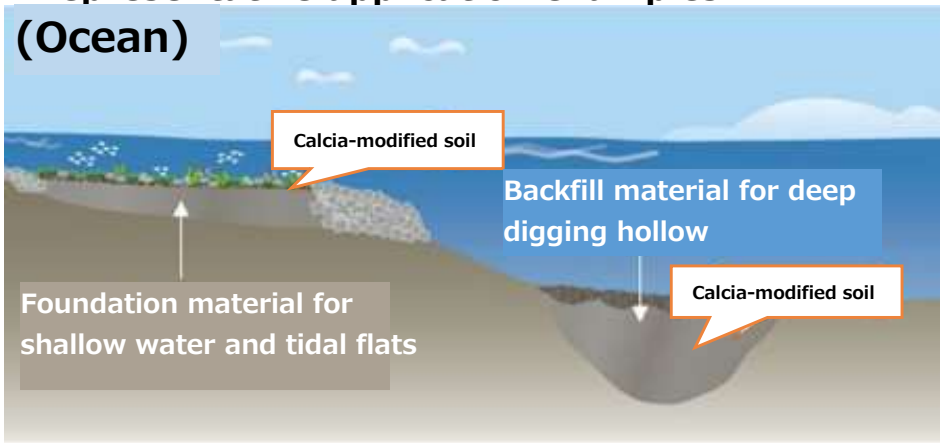
Contributing to smoother dredging project promotion

Soft dredged soil

Calcia modifier

Calcia-modified soil

<Representative application examples>



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