



ENEOS

Third Medium-Term Management Plan **Carbon Neutrality Plan**

May 11, 2023

ENEOS Holdings, Inc.
[E²-ne-ohs]

ENEOS Group Japan's Premier Energy and Materials Corporate Group

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ENEOS Group Carbon Neutrality Plan

ENEOS Group Long-Term Vision

The ENEOS Group is taking on the challenge of achieving both **stable supply of energy and materials** and **realization of a carbon neutral society**.

Our business areas surrounding carbon neutrality

Our contribution to primary energy in Japan: **Approx. 15%** (Conversion of oil & gas turnover¹)
Our greenhouse gas emissions (Scope 1+2+3): **Approx. 210 million tons per year**
(Japan's greenhouse gas emissions: Approx. 1.2 billion tons per year)

¹ Estimate by ENEOS based on figures published by the Ministry of Economy, Trade and Industry

ENEOS Group Carbon Neutrality Policy

To realize a carbon-neutral society, we will reduce our greenhouse gas emissions while pursuing **energy transition** and **a circular economy** to contribute to the **reduction of society's greenhouse gas emissions**.

Reduction of our greenhouse gas emissions

Preparation for future increases in carbon prices

- Aim for the realization of carbon neutrality in our emissions² by FY2040.
² Scope 1+2
- Aim for the reduction of greenhouse gases by 46%³ by FY2030.
³ Compared to FY2013
- To achieve carbon neutrality, we will broadly engage in the reduction of greenhouse gas emissions, CCS (carbon dioxide capture and storage), and CO₂ removal (absorption by forests, etc.).

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Contribution to the reduction of society's greenhouse gas emissions


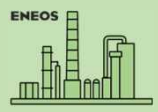
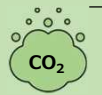


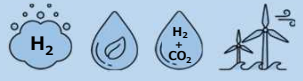

Carbon neutrality as a pillar of future business

- Working in step with the government and other companies, aim for the realization of carbon neutrality, including Scope 3, by FY2050.
- In the energy area, we aim to halve CO₂ emissions per unit of energy supplied (CI⁴) by around FY2040 by promoting energy transition through expansion of renewable energy and early practical implementation of hydrogen and carbon-neutral fuel.
- In the materials and services area, we will pursue the development of a circular economy and the expansion of avoided emissions through conversion of raw materials, etc.

⁴ Carbon Intensity

Initiatives for the Realization of Carbon Neutrality

Pursue reduction of our greenhouse gas emissions while actively contributing to the reduction of greenhouse gas emissions of society

Policies on Initiatives for the Realization of Carbon Neutrality	ENEOS Measures
<p>Reduction of our greenhouse gas emissions (Scope1+2)</p> 	<p>Curbing greenhouse gas emissions </p> <ul style="list-style-type: none"> • Appropriate treatment of crude oil (according to demand) • Efficiency improvement of manufacturing and businesses (energy conservation, fuel switching, utilization of renewable energy, etc.) • Utilization of carbon credit <p>Artificial fixation of CO₂ </p> <ul style="list-style-type: none"> • CCS (carbon dioxide capture and storage) • New methods such as BECCS¹ and DACCS² utilizing CCS <p>Increase of natural absorption of CO₂ </p> <ul style="list-style-type: none"> • Absorption by forests (afforestation and forest management, etc.) • Other natural absorption methods (blue carbon and soil carbon fixation)
<p>Contribution to the reduction of society's greenhouse gas emissions (Scope3, avoided emissions)</p> 	<p>Contribution to the reduction of emissions in the energy area </p> <ul style="list-style-type: none"> • Pursuit of energy transition (hydrogen, carbon-neutral fuels, renewable energy, etc.) <p>Contribution to the reduction of emissions in the materials and services area </p> <ul style="list-style-type: none"> • Pursuit of circular economy (recycling, sharing, etc.) • Expansion of supply of products contributing to avoided emissions

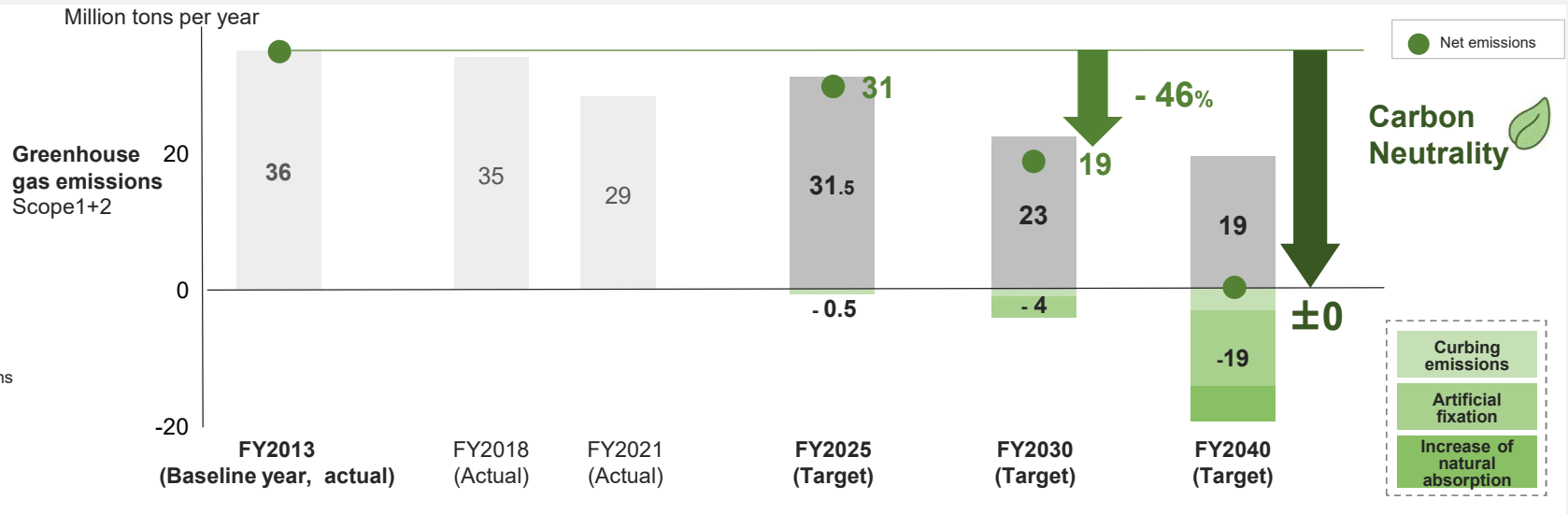
1 BECCS : Bio energy with carbon dioxide capture and storage

2 DACCS : Direct air capture with carbon dioxide capture and storage Copyright © ENEOS Holdings, Inc., ENEOS Corporation All Rights Reserved.

Roadmap for Reduction of ENEOS Group Greenhouse Gas Emissions

ENEOS Group Initiatives for the realization of carbon neutrality		FY2025	FY2030	FY2040	
Greenhouse gas emission target (Scope1+2) <small>Comparison with baseline year shown in parentheses</small>		≤31 (-14%)	≤19 (-46%)	±0 (-100%)	
Unit: million tons per year	Methane emissions² (Oil & Natural Gas E&P)	350 tons (-80%)	Less than 300 tons		
Assumed emissions according to demand for fuel, etc.		31.5	23	19	
Action	Curbing our greenhouse gas emissions	Energy saving, fuel conversion, etc.	- 0.5	- 1	- 3
	Artificial fixation of CO₂	CCS (carbon dioxide capture and storage) , etc.	-	- 3	- 11
	Increase of natural absorption of CO₂	Forest absorption, etc.	-0.5 (create)	-2 (create)	- 5

Baseline year: FY2013
Greenhouse gas emissions: 36 million tons¹



1 Figure revised from time of announcement in May 2022 (30 million tons) due to a change in calculation method for domestic emissions from the standard under the Global Warming Countermeasures Act to the GX-ETS standard.³

2 Methane emissions (FY2021): 1,600 tons

3 No change in targets of transition-linked bonds (issued on June 15, 2022), however, changing FY2030 greenhouse gas emissions targets to 19 million tons from 16 million tons

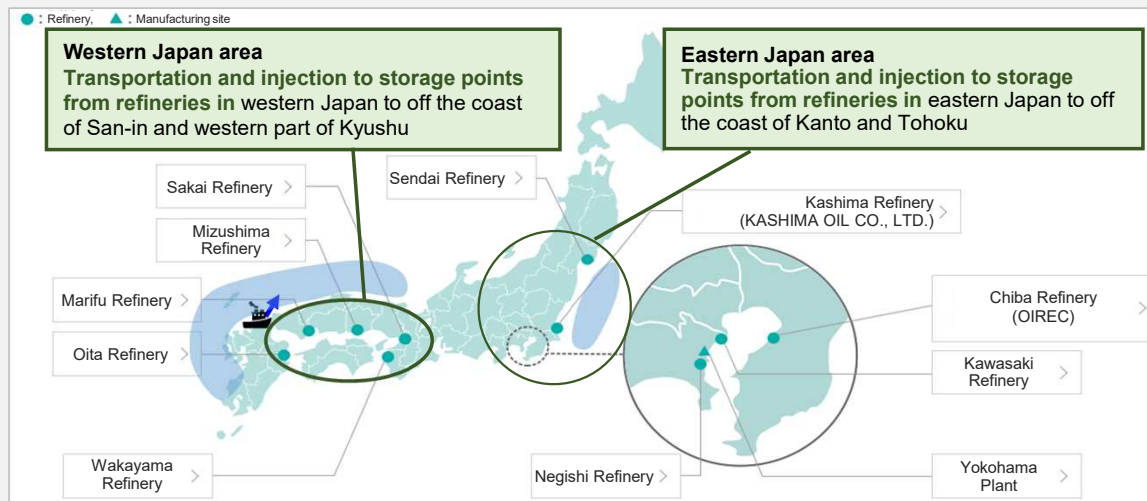
Efforts for Our Reduction of Greenhouse Gas Emissions

CCS (carbon dioxide capture and storage)

Aim at the start of domestic CCS from FY2030

ENEOS efforts for the realization of domestic CCS

- West Japan Carbon dioxide Storage Survey Co., Ltd. established jointly by three companies, Electric Power Development Co., Ltd., ENEOS, and JX Nippon Oil & Gas Exploration Corporation, for the storage of CO₂ in western Japan. (Feb. 2023)
- Acquisition of share of Japan Drilling Co., Ltd., which has offshore drilling technology necessary for CO₂ storage (Mar. 2023)



Increase of natural absorption

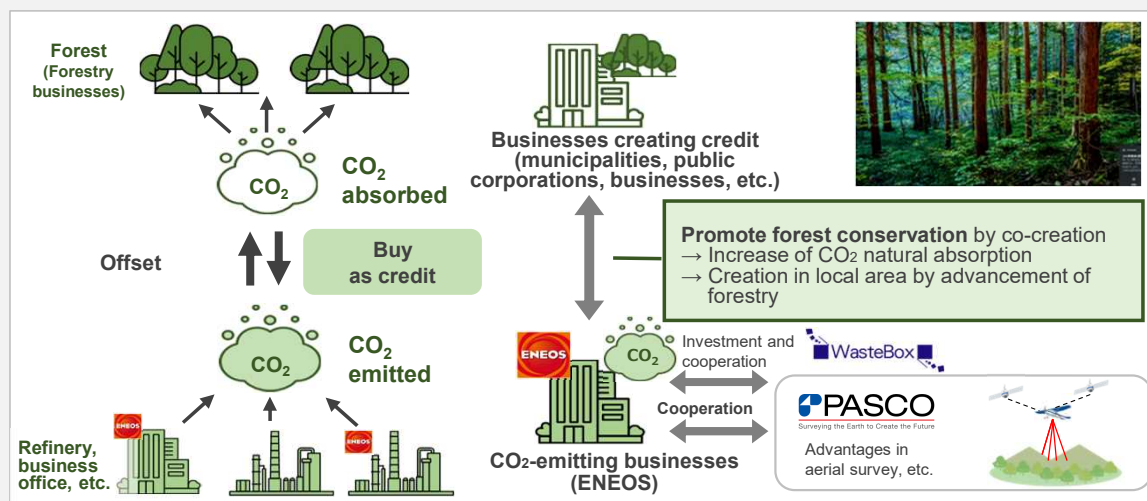
Promote the creation of credit of natural absorption such as absorption by forests

ENEOS efforts for absorption by forests abroad

- Decided to invest in large overseas fund of Japanese businesses formed by Sumitomo Forestry Co., Ltd. (May 2023)

ENEOS efforts for absorption by forests in Japan


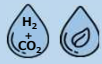


- Agreed to J-Credit Creation Project with Niigata Public Corporation of Agriculture and Forestry, following Kumakogen Town, Ehime (Nov. 2022)
- Start joint study on support for J-Credit creation with PASCO CORPORATION (May 2023)



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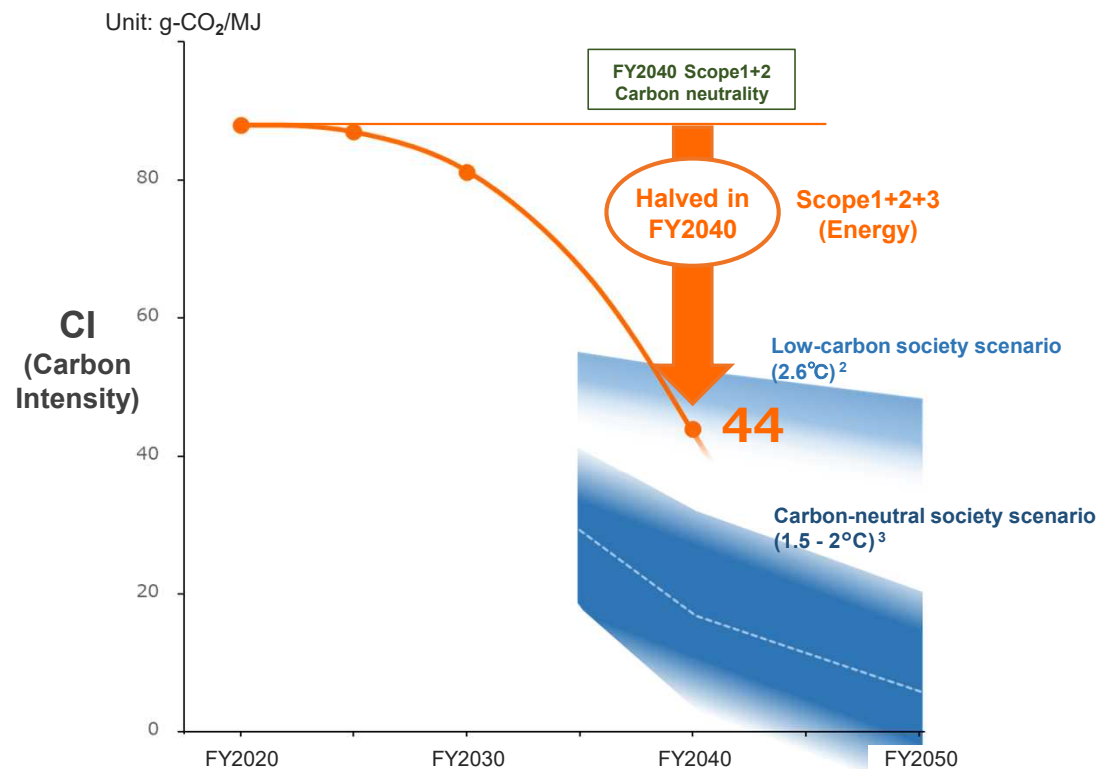
Pursuing Energy Transition

Aim to halve CO₂ emissions per unit of energy supply (CI) by FY2040

Vision for FY2040		Business scale target for FY2040
CO ₂ -free Hydrogen 	Establish the largest manufacturing and supply system in Japan	1 - 4 million tons
Carbon-neutral fuels 	SAF ¹	Domestic share 50%
	Biofuel	Positioned as a fuel required for transition, effectively utilized as a base material Supply 20% blend with gasoline* <small>*Biofuel + Synthetic fuel</small>
	Synthetic fuel	Operate large-scale commercial plant for synthetic fuel Synthetic fuel manufacturing At least 10,000 barrels per day
Renewable energy 	Establish a position as a major player in renewable energy power source development	Total power generated from renewable energy 6 - 8 GW
CCS (for other companies) (carbon dioxide capture and storage) 	Create the largest CCS value chain in Japan and make it profitable	4 - 10 million tons

1 Sustainable Aviation Fuel

CI targets for the energy supplied by the ENEOS Group



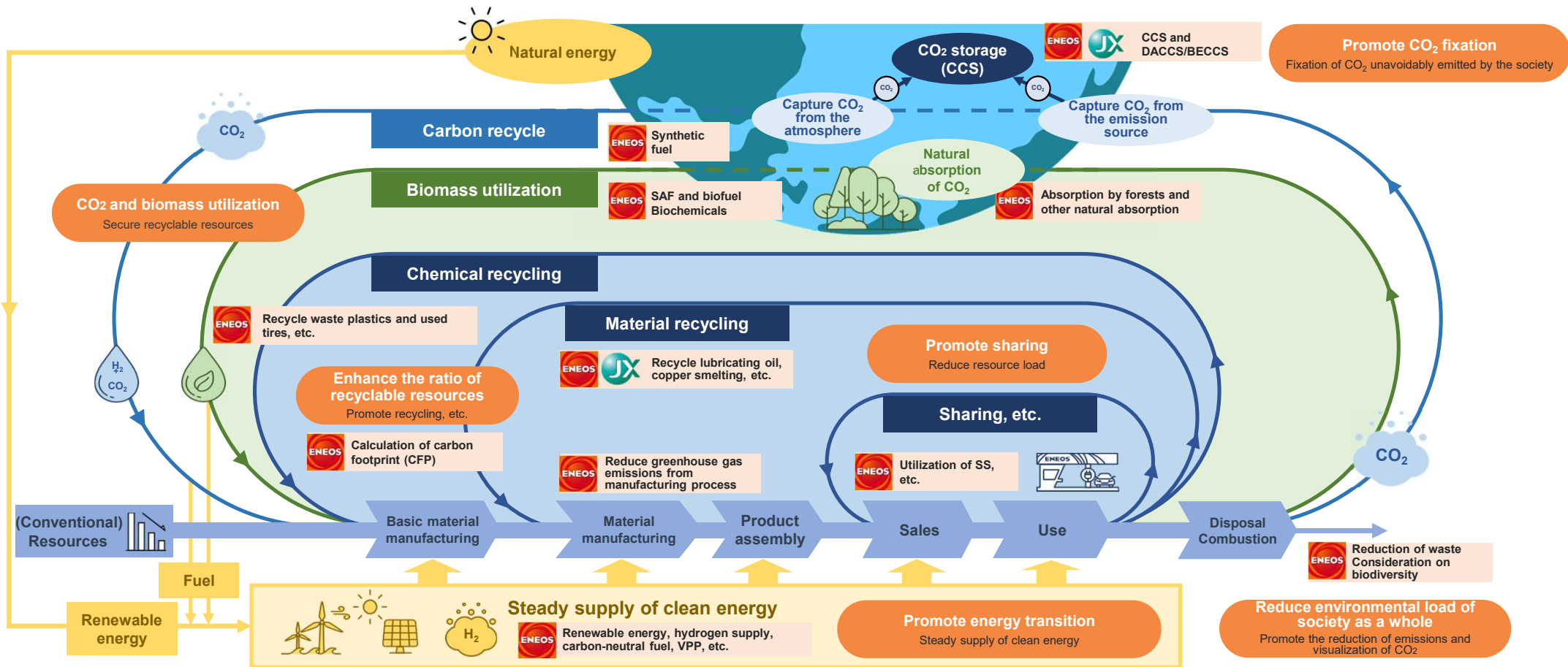
CI (Carbon Intensity)
Indicator of CO₂ emissions (g) (Scope 1+2+3) per unit of energy supply (MJ).
Reduced due to supply of hydrogen, carbon-neutral fuels, renewable energy, etc.
Does not include materials (petrochemicals, lubricants, asphalt, etc.)

2 ENEOS assumptions referring to IEA STEPS case,
3 ENEOS assumptions referring to IEA APS/NZE case

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Promotion of Efforts for the Realization of Carbon-Neutral and Circulating Society

Promotion of efforts for circular economy to realize circulating society independent from conventional resources



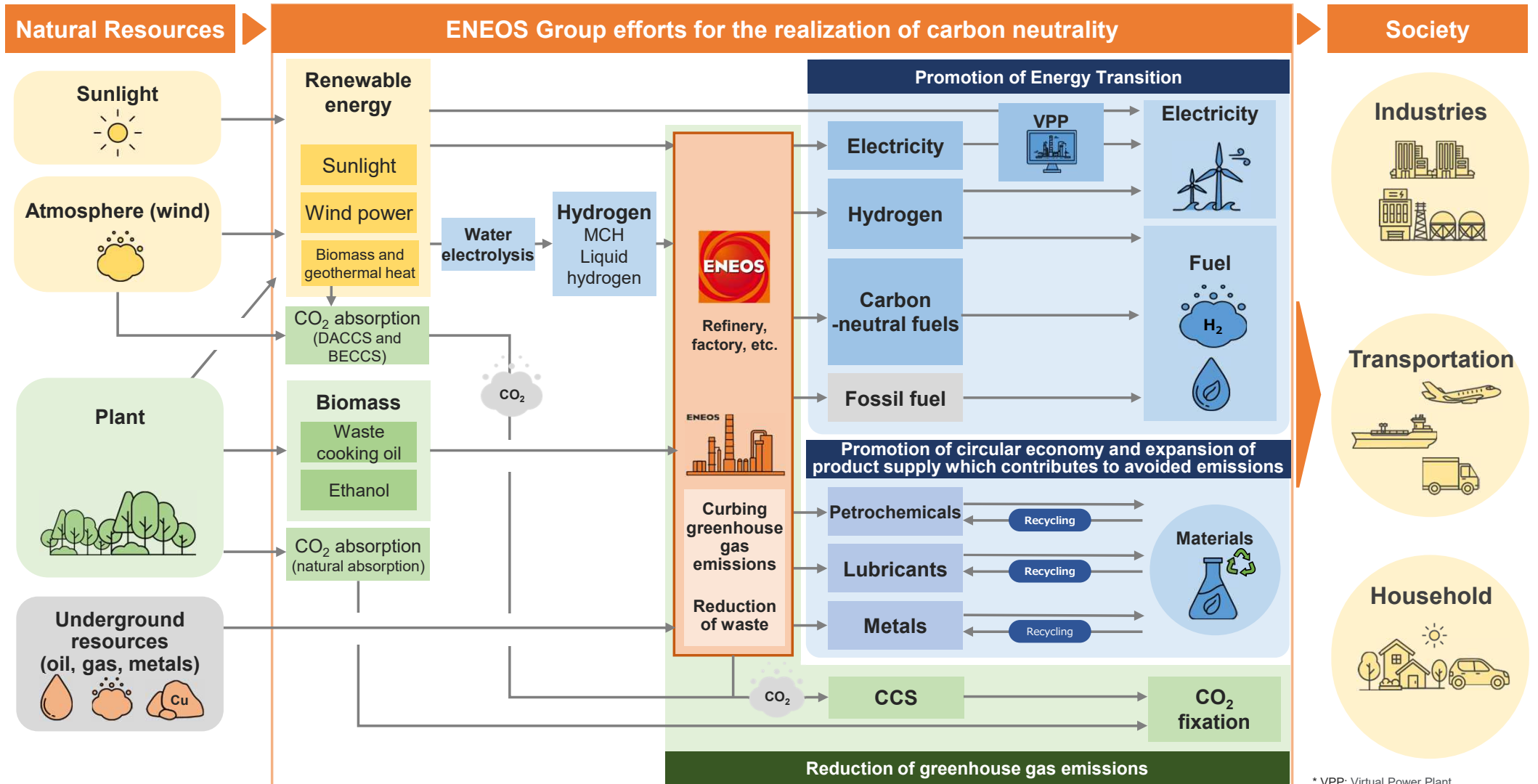
Road Map for the Reduction of Greenhouse Gas Emissions of Society

Efforts for the Realization of Carbon-Neutral Society

			FY2025	FY2030	FY2040	
Energy field	Promote energy transition	CI (Carbon Intensity)	87 g-CO ₂ /MJ	81 g-CO ₂ /MJ	44 g-CO ₂ /MJ	
		CO ₂ -free Hydrogen	Investment decision for commercialization	250 thousand tons	1-4 million tons	
		Carbon neutral fuels	SAF	1st case investment decision	500-700 thousand KL	Domestic share: 50%
			Biofuel	–	Supply 10% mixing to high-octane gasoline ^{*1}	Supply 20% mixing to gasoline ^{*1}
			Synthetic fuel	Demonstration of 1 barrel/day-scale	Manufacture synthetic fuel 300 barrels/day	Manufacture synthetic fuel 10 thousand barrels/day or more
		Renewable energy Renewable energy total power generation capacity	2 GW	3 GW	6-8 GW	
		CCS (for other businesses)	–	–	4-10 million tons	
Materials and service field	Promote circular economy	Petrochemicals Non-fossil resource ratio ^{*2}	20 thousand ton-scale Start of waste plastic liquefaction business	20%	35%	
		Lubricants Recycling amount	Completion of demonstration	100 thousand KL	200 thousand KL	
		Copper smelting Recycling ratio	–	25%	50%	
		Final disposal ratio of waste	Less than 1.0%			
		Expansion of products which contribute to avoided emissions	Avoided emissions (materials) ^{*3}	750 thousand tons-CO ₂ e	1,500 thousand tons-CO ₂ e	2,000 thousand tons-CO ₂ e

^{*2} Input ratio of green raw materials (waste-plastic-recycled oil, bionaphtha, etc.) against the production volume of products derived from naphtha cracker
^{*3} Assuming about 20-30 million tons-CO₂e of avoided emissions (for fiscal 2040) by hydrogen and carbon-neutral fuel.

Conceptual Diagram of Carbon Neutrality Plan





References

Carbon Neutrality Plan (Changes from the Plan Published Last Year)

		Carbon Neutrality Plan Published in May 2023	Carbon Neutrality Plan Published in May 2022
Changes	Scope1+2	Greenhouse gas emissions target is revised in line with GX-ETS calculation standard.	Emissions on the premise of Act on Promotion of Global Warming Countermeasures
	Scope3 and avoided emissions	Determine the specific and quantitative goals for the efforts and establish the intermediate targets (Promote energy transition/circular economy and expand products which contribute to avoided emissions)	No quantitative targets
Target setting	Scope1+2	FY2030 Reduction of greenhouse gas emissions by 46%* <small>* Base year: Fiscal 2013</small>	Reduction of greenhouse gas emissions by 46%* <small>* Base year: Fiscal 2013</small>
		FY2040 Net zero greenhouse gas emissions (Carbon neutrality)	Net zero greenhouse gas emissions (Carbon neutrality)
	Scope3 Avoided emissions	FY2040 Reduction of halve CO ₂ emissions per energy supply (CI)* <small>* Carbon Intensity</small>	—
		FY2050 Aim for the realization of carbon neutrality in step with the government and other businesses.	Aim for the realization of carbon neutrality in step with the government and other businesses.

Road Map for Our Reduction of Greenhouse Gas Emissions

ENEOS Group efforts for the realization of carbon neutrality

		FY2025	FY2030	FY2040	
Greenhouse gas emissions target (Scope1+2) <small>Figures in the parentheses indicate the ratio against base year</small>		≤31 (-14%)	≤19 (-46%)	±0	
Unit; million tons/year	Methane emissions*2 (oil development department)	350 tons (-80%)	Less than 300 tons	(-100%)	
Baseline according to the demand for fuels, etc.		31.5	23	19	
Action	Control of our greenhouse gas emissions	Energy saving, fuel conversion, etc.	-0.5	-1	-3
	Artificial fixation of CO₂	CCS (carbon dioxide capture and storage)	-	-3	-11
		BECCS and DACCS	-	-	-10
		BECCS and DACCS	-	-	-1
	Increase of CO₂ natural absorption		-0.5 (creation)	-2 (creation)	-5
		Absorption by forests	-0.5 (creation)	-2 (creation)	-4
		Other natural absorption*3	-	-	-1

Base year: Fiscal 2013

Greenhouse gas emissions (base year): 36 million tons*1

*1 The figures as of May 2022 (30 million tons) have been revised in association with the change of calculation method for domestic emissions from the standard of Act on Promotion of Global Warming Countermeasures to the standard of GX-ETS*4.

*2 Methane emissions (fiscal 2021): 1,600 tons

*3 Blue carbon and soil carbon fixation, etc.

*4 The greenhouse gas emissions target for fiscal 2030 in the Transition-Linked Bond (issued on June 15, 2022) is changed from 16 million tons to 19 million tons.

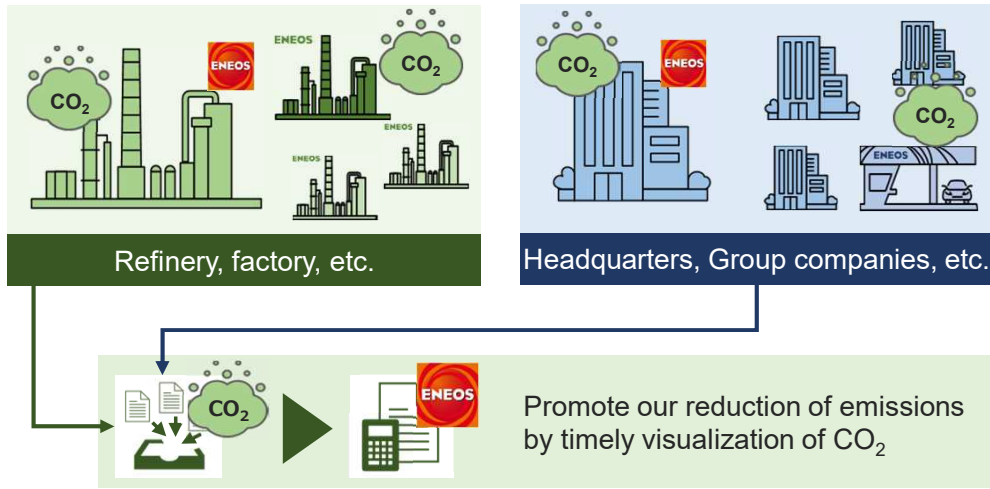
Efforts for Our Control of Greenhouse Gas Emissions

Promotion of the visualization of CO₂

Promote the visualization of our greenhouse gas emissions and the society for the control of greenhouse gas emissions

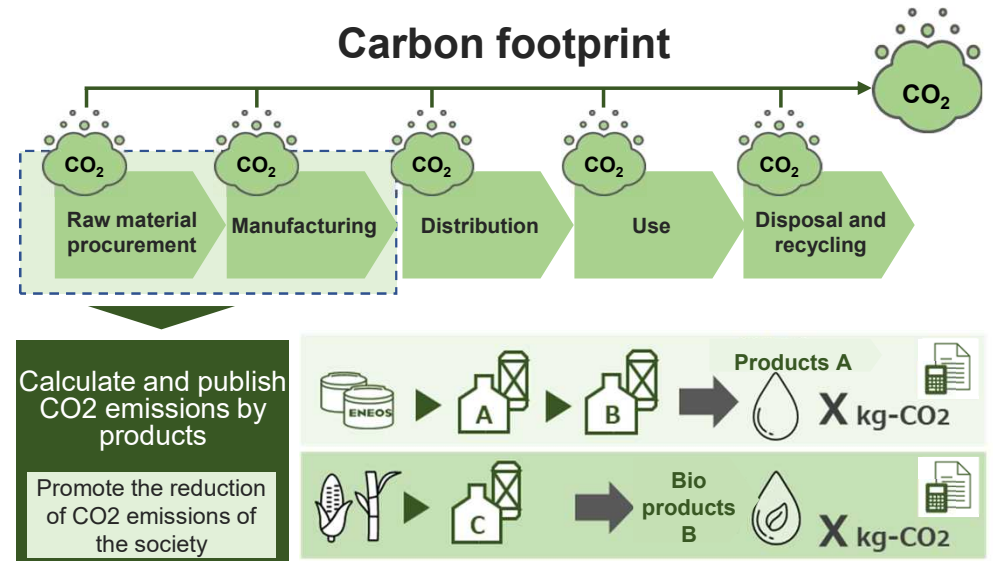
Visualization of in-house CO₂ toward our reduction of emissions

Carbon accounting



Visualization of CO₂ from products supplied toward the reduction of emissions of society

Carbon footprint



ENEOS efforts for the visualization of CO₂

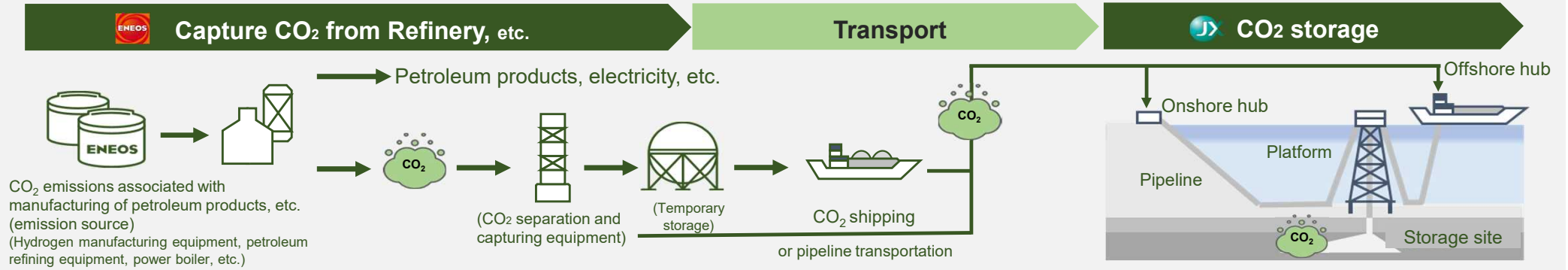
- Start of joint study on the domestic petroleum industry's first CO₂ visualization system in collaboration with WasteBox Co., Ltd. and NTT DATA Corporation. (Mar. 2023)

Future policy

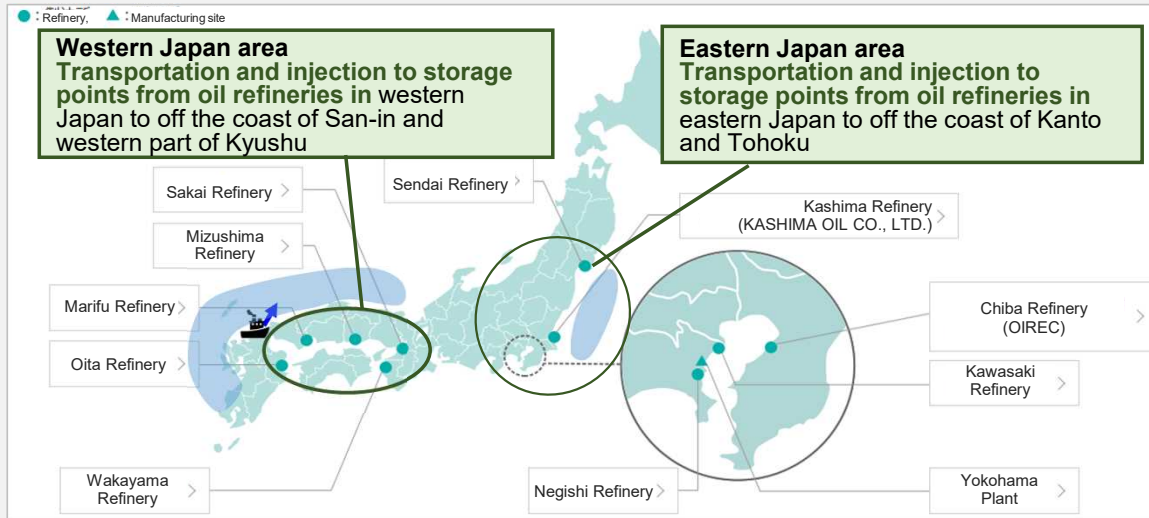
- Establish the system in fiscal 2023 and start operation for some products. Sequentially expand the target products

Efforts for CO₂ Fixation

Domestic CCS value chain of ENEOS



Exploration of domestic storage place



ENEOS efforts for the realization of domestic CCS

- West Japan Carbon dioxide Storage Survey Co., Ltd. established jointly by three companies, Electric Power Development Co., Ltd., ENEOS, and JX Nippon Oil & Gas Exploration Corporation, for the storage of CO₂ in western Japan. (Feb. 2023)
- Acquisition of share of Japan Drilling Co., Ltd., which has offshore drilling technology necessary for CO₂ storage (Mar. 2023)

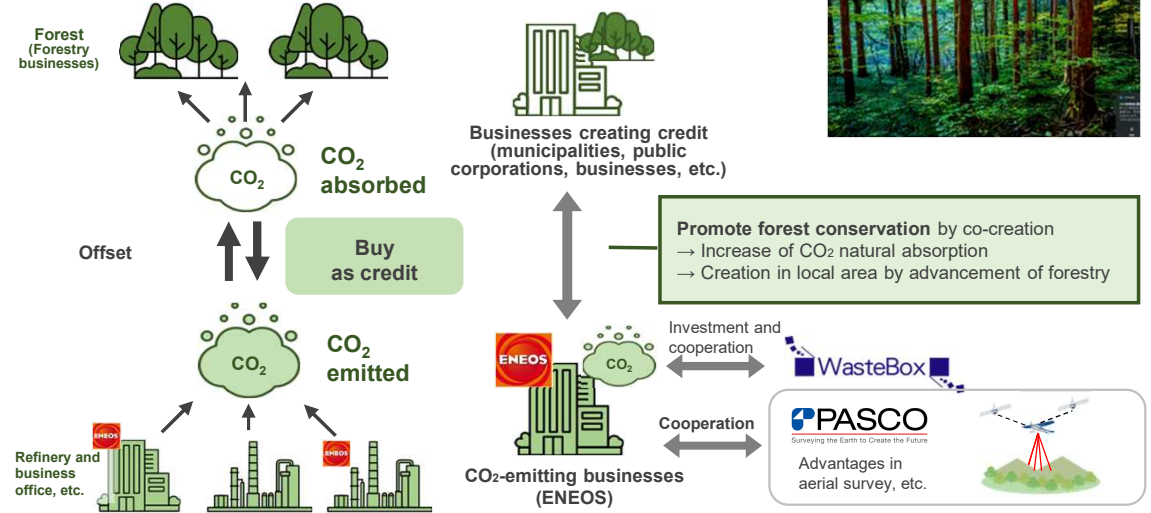
Future policy

- Study the creation of overseas credit in cooperation with the Japanese government
- Aim for the demonstration of BECCS and DACCS using CCS value chain planned to be established

Efforts for the Enhancement of Natural Absorption of CO₂

Efforts for the enhancement of absorption by forests

Activities for the enhancement of both domestic and overseas absorption by forests through credit



ENEOS efforts for absorption by forests abroad

- Decided to invest in large overseas fund of Japanese businesses formed by Sumitomo Forestry Co., Ltd. (May 2023)

ENEOS efforts for absorption by forests in Japan

- Agreed to J-Credit Creation Project with Niigata Public Corporation of Agriculture and Forestry, following Kuma Kogen Town, Ehime (Nov. 2022)
- Start joint study on support for J-Credit creation with PASCO CORPORATION (May 2023)

Future policy

- Creation of J-Credit in cooperation with local governments and public forestry corporations
- Creation of credit (JCM, etc.) for absorption by forests abroad

Efforts for the Enhancement of Natural Absorption Other than Absorption by Forests

Example of negative emission method, which is attracting attention

Blue carbon



Fix CO₂ in the ocean by absorbing CO₂ by seaweed, etc. Attracting attention in Japan surrounded by the sea

Soil carbon fixation



Fix carbon in the soil by biochar, plowing-in of fields, etc.

ENEOS efforts for blue carbon

- Authentication and acquisition of blue carbon credit in natural seaweed bed revitalization business (Mar. 2023)

Future policy

- Pursue initiatives for the demonstration of blue carbon, soil carbon fixation, etc. in Japan and overseas

List of Press Release on Our Efforts for Emission Reduction (May 2022 and after)

Carbon neutrality strategy	Holdings	May 2022	ENEOS Group Plan for Carbon Neutrality	
	Holdings	May 2023	Establishment of ENEOS Group Carbon Neutrality Plan	
Visualization of CO ₂	ENEOS	Mar. 2023	A first in the domestic petroleum industry Joint study launched on per-product CFP calculations and development of entity-level GHG emission management system	
CCS	Domestic	Holdings	May 2022	ENEOS and J-POWER collaborate on carbon neutralization of energy supply
		ENEOS/JX	May 2022	Receive Entrustment of Domestic CO ₂ Emission Source Survey and Survey on Domestic CO ₂ Capture in Specific Region and Transportation
	Overseas	ENEOS/JX	Jan. 2023	Japan's first full-scale CCS: ENEOS, JX and J-POWER to establish joint venture for feasibility study of domestic CCS storage projects
		Holdings	Sep. 2022	Acquisition of Equity of Petra Nova Parish Holdings LLC by JX Nippon Oil & Gas Exploration Corporation
		JX	Oct. 2022	JX and JGC Partner with PETRONAS to explore CCS Project
	Common	JX	Nov. 2022	JX and 8 Rivers Capital, LLC Sign MOU to Evaluate Gulf Coast to Deploy Sustainable, Infrastructure-Scale, Net Zero Solutions Project
		JX	Dec. 2022	Execution of Heads of Agreement with PETRONAS Carigali Sdn. Bhd.
		JX	Sep. 2022	Conclusion of a contract on joint research with JOGMEC on CO ₂ mineralization
		JX	Dec. 2022	JX Joins the CCS+ Initiative
		JX	Mar. 2023	Acquisition of share of Japan Drilling Co., Ltd.
BECCS	JX	Oct. 2022	The study on BECCS coherent demonstration model for CO ₂ -negative hydrogen production from domestic biomass is adopted by NEDO project.	
Absorption by forests	Domestic	ENEOS	Nov. 2022	Signing of Partnership Agreement for "the Realization of a Decarbonized Society Through Forests Conservation"
		Holdings	Jan. 2023	Start joint demonstration on forest development in consideration of biodiversity
	Overseas	ENEOS	May 2023	Collaboration in creation of J-credits derived from Forest management using Aerial laser surveying
Other natural absorption	Holdings	ENEOS	May 2023	Investment in large scale Forestry Fund in US
		Holdings	Mar. 2023	Authentication and acquisition of carbon credit in revitalization business of natural seaweed bed