



エネルギーを新しい時代へ

FY2021 Investors Meeting

(Note) The company's fiscal year (FY) is from April 1 to March 31 of the following year in this material.
FY2021 denotes the period from April 1, 2021 to March 31, 2022.

JERA Co., Inc.

May, 2022

Outline of Financial Results

Consolidated Statement of Income

(Unit: Billion Yen)

	FY2021(A)	FY2020(B)	Change(A-B)	Rate of Change(%)
Operating revenue (Net sales)	4,435.2	2,730.1	1,705.1	62.5
Operating income	132.9	249.4	(116.4)	(46.7)
Ordinary income	95.3	244.1	(148.8)	(60.9)
Net income attributable to owners of parent	24.6	157.8	(133.2)	(84.4)
<Reference>Income excluding time lag	277.0	111.6	165.4	148.2

Consolidated Balance Sheet

(Unit: Billion Yen)

	FY2021(A)	FY2020(B)	Change(A-B)	Rate of Change(%)
Assets	8,722.1	4,090.8	4,631.3	113.2
Liabilities	6,747.8	2,328.7	4,419.0	189.8
Net assets	1,974.3	1,762.1	212.2	12.0
Outstanding interest- bearing debt	2,646.5	1,613.2	1,033.2	64.0
Equity ratio (%)	20.7	41.2	(20.5)	

Key Points of Financial Results

【Operating Revenue】

- Operating revenue **increased by 1,705.1 billion yen (up 62.5%) from the previous consolidated fiscal year to 4,435.2 billion yen** mainly due to an increase in electrical energy sold and an increase in sales of JERA Global Markets Pte. Ltd. (JERAGM) .

【Net income】

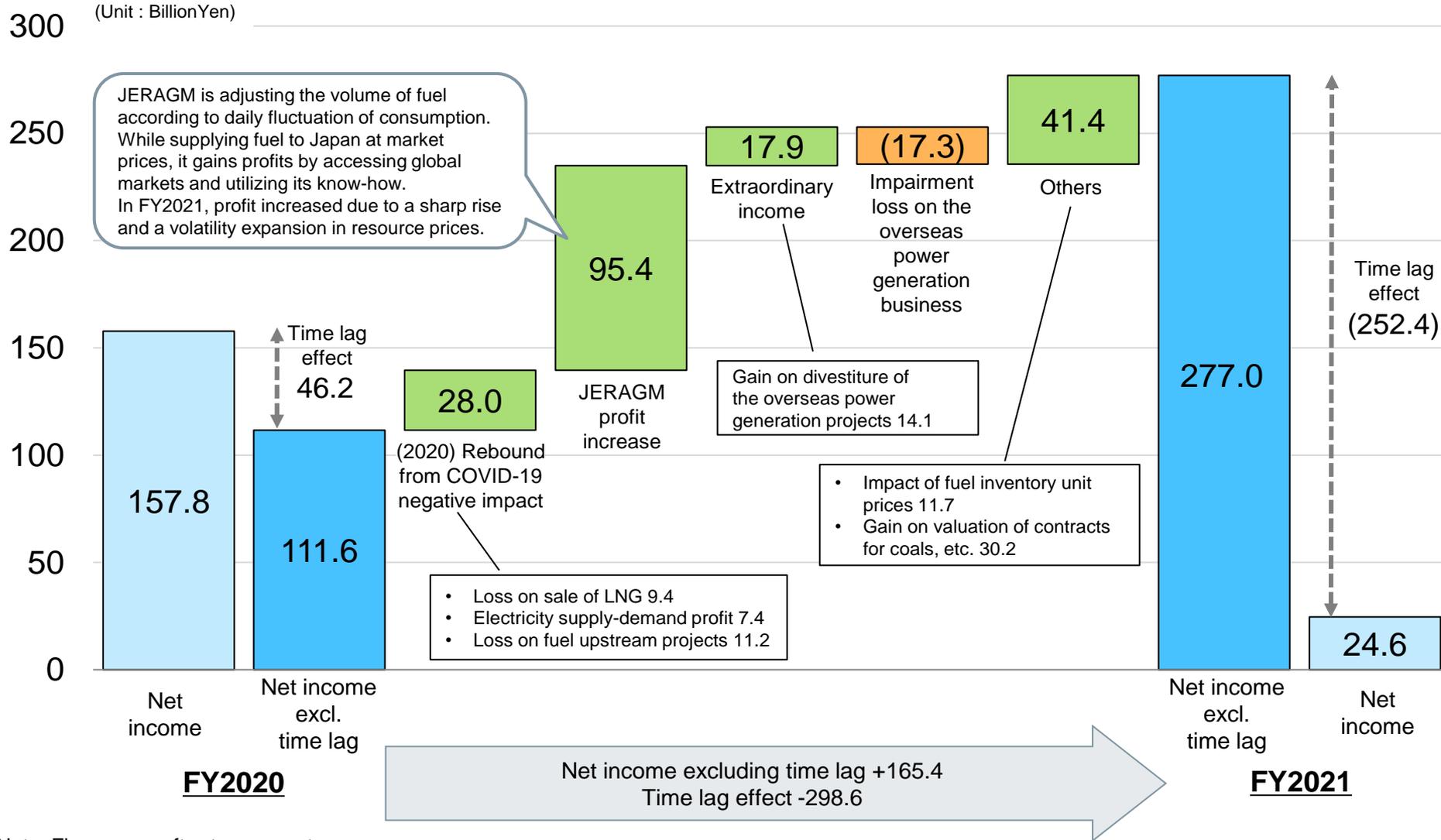
- Net income **decreased by 133.2 billion yen (down 84.4%) from the previous consolidated fiscal year to 24.6 billion yen.**
 - The effect of time lag shifted from gains to significant losses. (-298.6 billion yen [46.2 billion yen to -252.4 billion yen])
 - Net income excluding time lag increased. (+165.4 billion yen [111.6 billion yen to 277.0 billion yen])
- Net income excluding the effect of time lag increased mainly due to the rebound from COVID-19 negative impact in the previous consolidated fiscal and JERAGM profit increase from fuel volume adjustment.

Equity ratio

- JERAGM engaged in fuel trading makes contracts for both procurement and sales as physical and financial transactions* and the fair value of the outstanding all contracts are reported as assets “derivative securities” and liabilities “derivative obligations” in the statement of financial position. Significant changes in fair value due to a spike of fuel index prices have led to huge increases in both derivative asset and liabilities, then equity ratio dropped.

*Singapore Financial Reporting Standard

Analysis of Consolidated net income



Note: Figures are after-tax amounts.

Consolidated Income/Expenditure Comparison

(Unit: Billion Yen)

	FY2021(A)	FY2020 (B)	Change(A-B)	Main Factors of Changes
Operating revenue (Net sales)	4,435.2	2,730.1	1,705.1	<ul style="list-style-type: none"> • Increase of electrical energy sold • Increase in sales of JERAGM
Operating expenses	4,302.2	2,480.7	1,821.5	<ul style="list-style-type: none"> • Increase of fuel costs • Increase in costs of JERAGM
Operating income	132.9	249.4	(116.4)	
Non-operating income	8.5	17.5	(8.9)	
Non-operating expenses	46.1	22.7	23.3	<ul style="list-style-type: none"> • Share of loss of entities accounted for using equity method 23.7
Ordinary income	95.3	244.1	(148.8)	<ul style="list-style-type: none"> • Decrease of time lag income -414.6(64.1→-350.5) • Increase of income excluding time lag +265.8(180.0→445.8)
Extraordinary income	23.9	-	23.9	<ul style="list-style-type: none"> • Gain on divestiture of the overseas power generation projects 19.7
Extraordinary loss	22.9	16.3	6.5	<ul style="list-style-type: none"> • Impairment loss of domestic thermal power generation equipment 22.9
Income taxes, etc.	(15.5)	54.1	(69.7)	
Net income attributable to non-controlling Interests	87.2	15.7	71.4	
Net income attributable to owners of parent	24.6	157.8	(133.2)	

Key Elements of Income and Expenditure

	FY2021(A)	FY2020(B)	Change(A-B)
Electrical Energy Sold(TWh)	255.5	246.6	8.9
Crude Oil Prices(JCC) (dollar/barrel)	77.1	43.4	33.7
Foreign Exchange Rate (yen/dollar)	112.4	106.1	6.3

Note: Crude Oil Prices(JCC) for FY2021 is tentative.

Consolidated Balance Sheet

(Unit: Billion Yen)

	As of Mar 31,2022(A)	As of Mar 31,2021(B)	Change(A-B)	Main Factors of Changes
Cash and deposits	514.3	616.1	(101.8)	
Property, plant and equipment	2,173.8	2,010.0	163.8	• Progress in replacing domestic thermal power plants
Investment securities	1,026.2	559.4	466.8	• Investment in new project
Others	5,007.8	905.3	4,102.4	• Increase in derivative securities (JERAGM, etc.) +2,978.8
Assets	8,722.1	4,090.8	4,631.3	
Outstanding interest-bearing debt	2,646.5	1,613.2	1,033.2	• Borrowings +626.2 (Subsidiaries +429.6) • Commercial Paper +297.0 • Corporate Bonds +110.0
Others	4,101.2	715.4	3,385.8	• Increase in derivative obligations (JERAGM, etc.) +2,813.2
Liabilities	6,747.8	2,328.7	4,419.0	
Shareholders' equity	1,688.1	1,696.9	(8.7)	• Dividends paid -33.4 • Net income +24.6
Others	286.2	65.1	221.0	• Foreign currency translation adjustments +87.9
Net Assets	1,974.3	1,762.1	212.2	
Equity ratio (%)	20.7	41.2	(20.5)	• Decrease in the ratio mainly due to an increase in both derivative securities and obligations

Consolidated Cash Flows

(Unit: Billion Yen)

		FY2021(A)	FY2020(B)	Change(A-B)
Cash flows from operating activities		(340.4)	340.8	(681.2)
Cash flows from investing activities	Purchase of non-current assets	(311.1)	(241.3)	(69.7)
	Purchase of investment securities	(376.8)	(31.5)	(345.2)
	Others	26.9	0.8	26.1
		(661.0)	(272.0)	(388.9)
Free cash flows		(1,001.4)	68.7	(1,070.2)
Cash flows from financing activities	Net increase/decrease in outstanding interest-bearing debt	917.9	103.2	814.6
	Dividends paid *	(33.4)	(27.0)	(6.4)
	Others	(12.7)	13.2	(26.0)
		871.7	89.5	782.2
Net increase/decrease in cash and cash equivalents (parenthesis indicates decrease)		(100.2)	159.2	(259.4)

* Excluding Dividends paid to non-controlling interests

Segment Information

(Unit: Billion Yen)

	FY2021 (A)		FY2020 (B)		Change (A-B)		Main Factors of Changes in Net Income
	Operating Revenue	Net Income	Operating Revenue	Net Income	Operating Revenue	Net Income	
Fuel Related *1	2,995.5	161.3	1,076.2	48.0	1,919.3	113.3	<ul style="list-style-type: none"> •(2020) COVID-19 negative impact +11.2 •JERAGM profit increase +95.4
Overseas Power Generation	4.1	(19.3)	2.6	(7.6)	1.4	(11.6)	<ul style="list-style-type: none"> •(2020) Loss on impairment +15.9 •Impairment loss in Formosa 2 -33.2 •Gain on divestiture of the overseas power generation projects +14.1
Domestic Thermal Power Generation and Gas Supply	3,119.4	(113.8) 138.5*2	2,391.0	152.8 106.6*2	728.3	(266.7) 31.8*2	<ul style="list-style-type: none"> •(2020) COVID-19 negative impact +16.8 •Impact of fuel inventory unit prices +11.7
Adjustments	(1,683.8)	(3.5)	(739.7)	(35.3)	(944.0)	31.8	<ul style="list-style-type: none"> •Gain on valuation of contracts for coals, etc. +30.2
Consolidated	4,435.2	24.6 277.0*2	2,730.1	157.8 111.6*2	1,705.1	(133.2) 165.4*2	

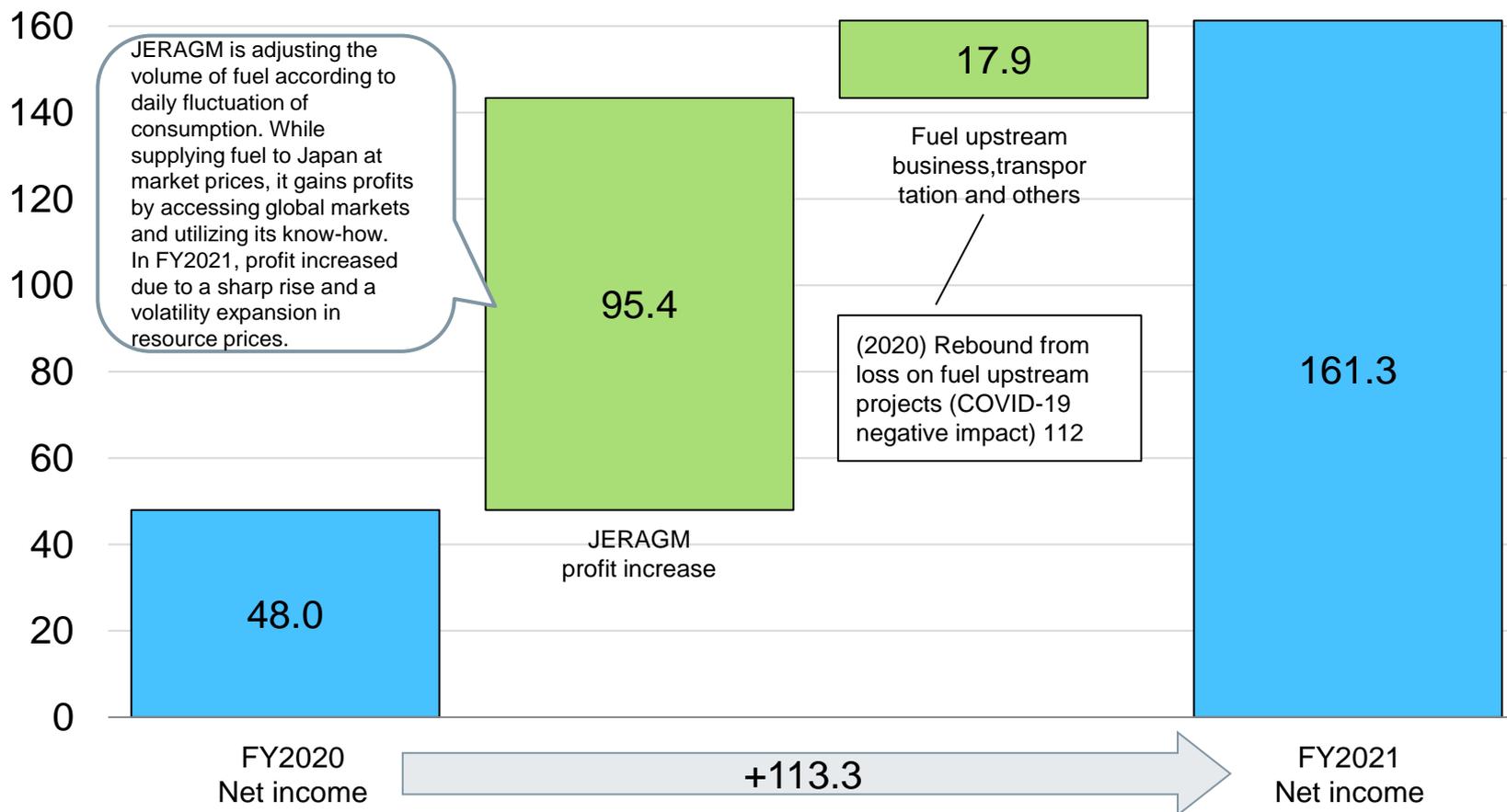
*1 Fuel upstream, transportation and trading

*2 Excluding the effect of time lag

Analysis of Fuel related business

- Net income increased mainly due to JERAGM profit increase from fuel volume adjustment.

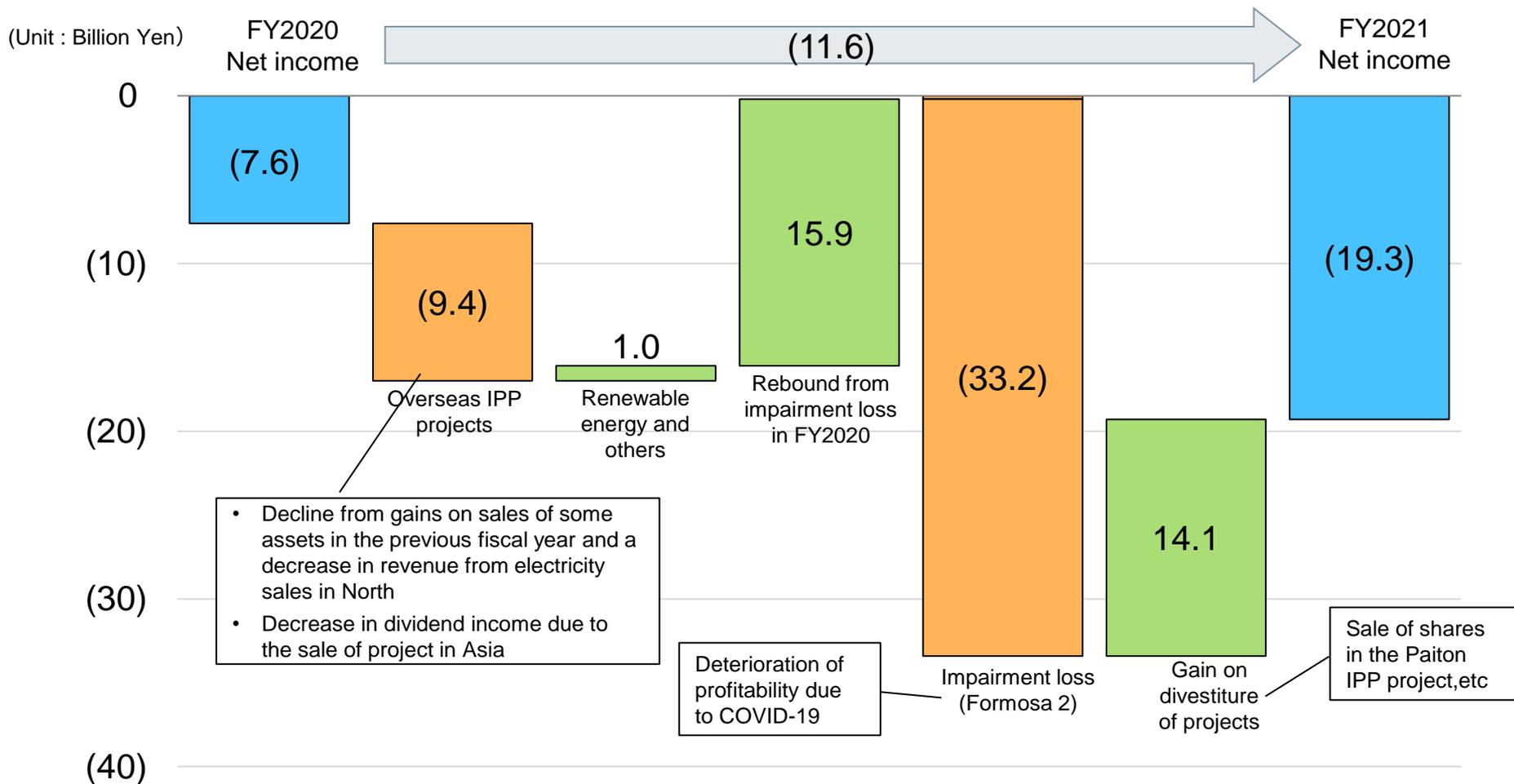
(Unit : Billion Yen)



Note: Figures are after-tax amounts.

Analysis of Overseas power generation business

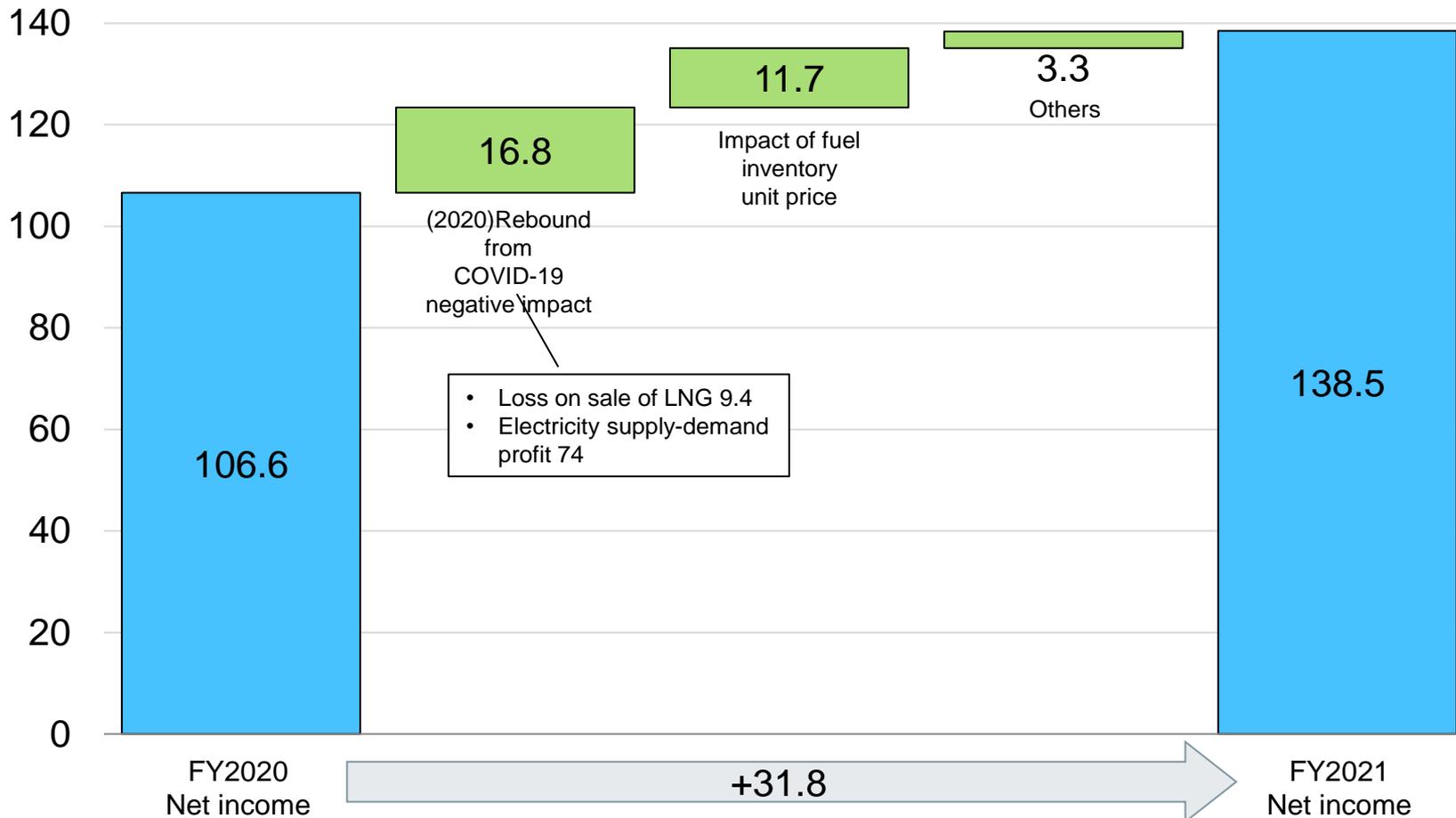
- Net income decreased due to impairment loss on Formosa 2 despite gain on divestiture of Paiton IPP project, etc.



Note: Figures are after-tax amounts.

- Net income excluding time lag increased due to the rebound from COVID-19 negative impact in the previous consolidated fiscal and effect from fuel inventory unit price.

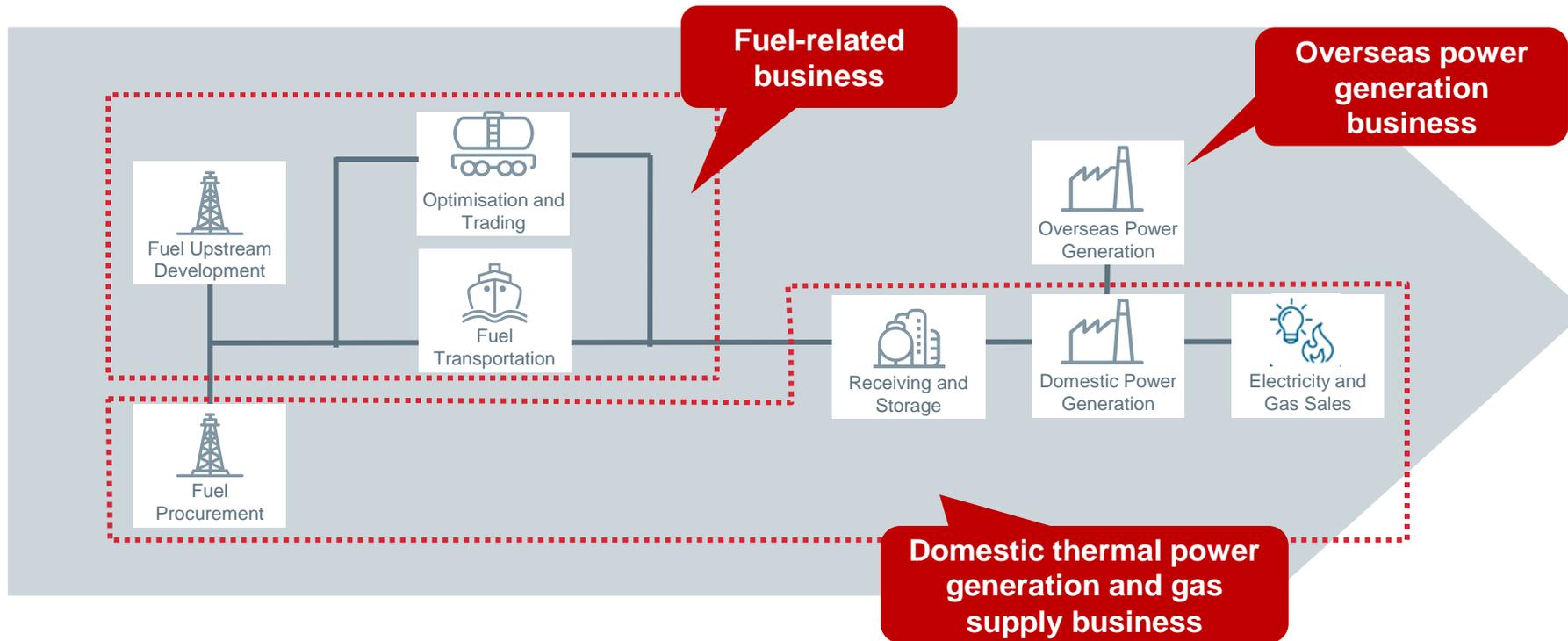
(Unit : Billion Yen)



Note: Figures are after-tax amounts excluding time lag.

(Reference) : JERA's Value Chain and Segment

- JERA owns the entire supply chains for fuel and thermal power generation, from fuel upstream business (development of gas fields) to transportation and storage (fuel terminal operation) to power generation and wholesaling.
- We have three business segments; "Fuel-related business" for investment in fuel upstream, transportation and trading business, "Overseas power generation business" for investment in overseas power generation business, and "Domestic thermal power generation and gas supply business" for sales of electricity and gas in Japan.



Forecast for FY2022

- JERA has not yet established consolidated financial results forecasts for the FY2022 as the outlook for resource prices and electric power sales is uncertain under the influence of the situation in Ukraine, etc. and business performance cannot be reasonably calculated at present.
- We will announce our financial results forecasts promptly when we are able to provide these disclosures.

Integration Synergy Effect

- Our target is to generate synergy effects of JPY 100 billion/year within 5 years of Step 3 integration.
- **We generated synergy effects of JPY 85 billion in FY2021** through improved cost competitiveness in domestic thermal power generation and the creation of new profit sources.

(Unit: Billion Yen)

【Integration Synergy Effect】

			FY2019	FY2020	FY2021
Creation of new profit sources	Profits from optimization of the entire value chain	<ul style="list-style-type: none"> ✓ Development of global trading business with EDFT based on CEPCO trading know-how and TEPCO business development know-how ✓ Realization of huge asset-backed trading that leverages one of the world's largest fuel trading volumes 	10.0	20.0	50.0
	Profits from expanding business portfolio	<ul style="list-style-type: none"> ✓ Development of projects that take advantage of our increased presence due to becoming, through Step 3 integration, one of the world's leading energy companies ✓ Development of projects that package upstream and downstream businesses ✓ Leverage both companies' competitive domestic sites and fund-raising capabilities 			
Improved cost competitiveness in domestic thermal power generation	Reduction in maintenance costs	<ul style="list-style-type: none"> ✓ Development of best practices in periodic inspections, repairs and materials procurement ✓ Utilization of economies of scale in material procurement and outsourcing ✓ Development and operation of state-of-the-art methods 	15.0	25.0	35.0
	Reduction in operation costs	<ul style="list-style-type: none"> ✓ Development of best practices in fuel procurement and power plant operation ✓ Development and operation of state-of-the-art methods 			
			45.0	45.0	85.0

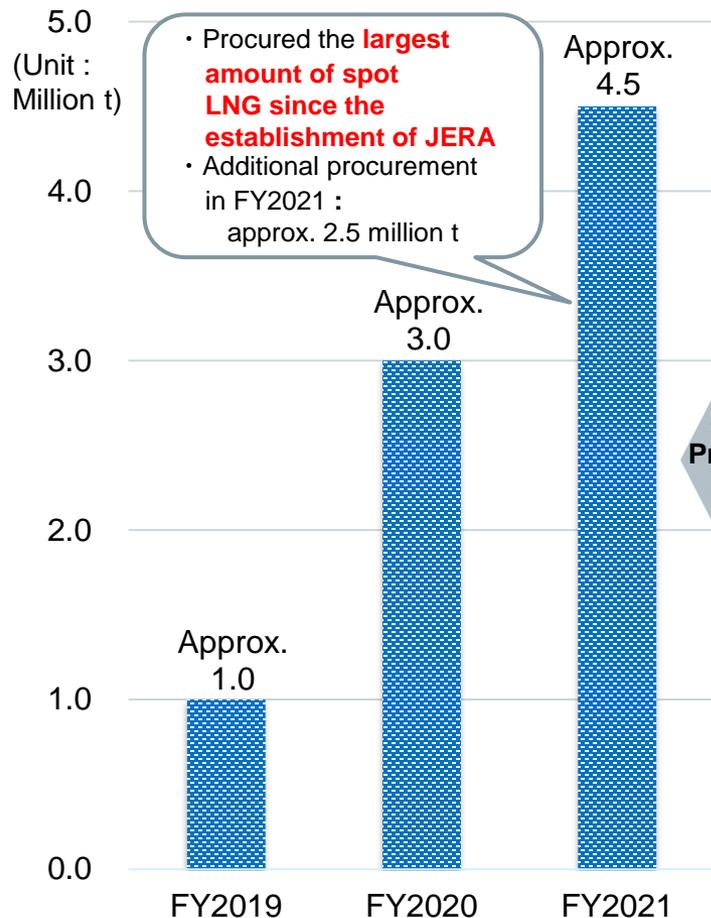
*Figures are pre-tax amounts.

Appendix: Financial Results

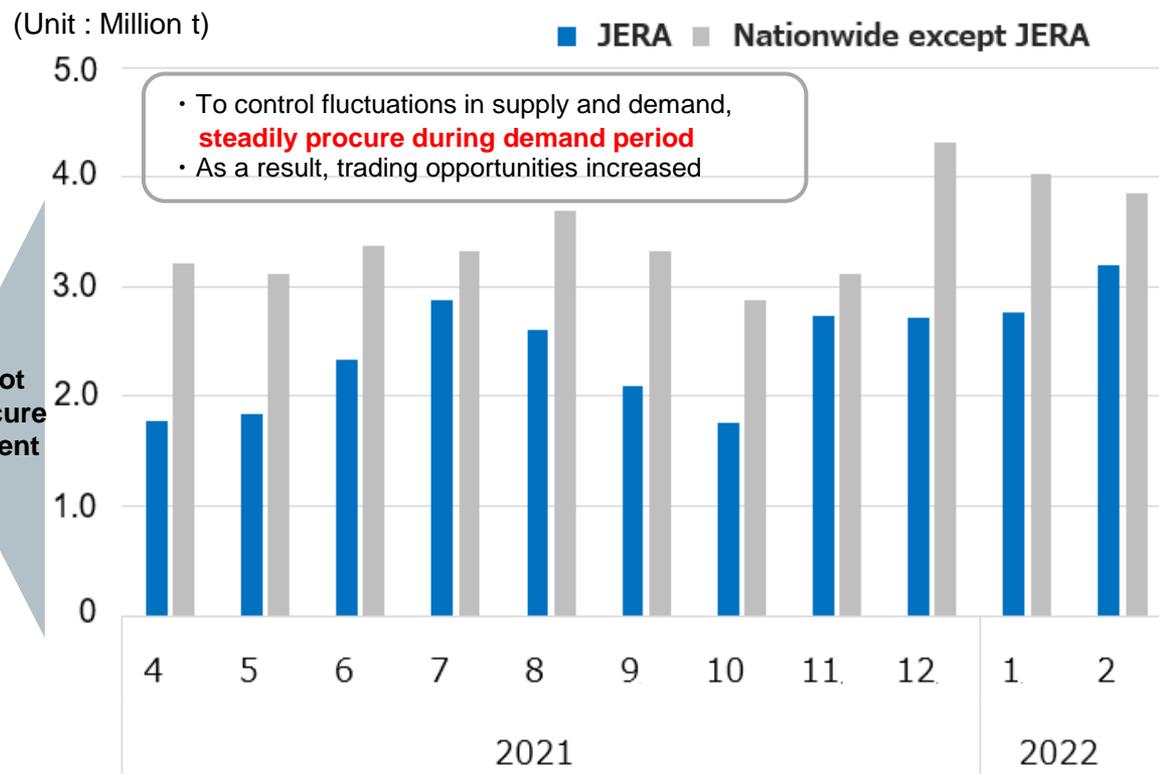
Fuel Procurement for Stable Supply : LNG Procurement Results

➤ JERA steadily procured additional LNG in response to supply-demand fluctuations during the demand period, contributing to stable supply. We will continue to make maximum efforts to procure fuels for stable supply.

Annual LNG Spot Procurement



Monthly LNG Receipts by JERA and *Nationwide except JERA



*Calculated by subtracting JERA's LNG received volume from the Total LNG import volume extracted from the Trade Statistics of Japan, Ministry of Finance.

(Reference)

Trends in crude oil price and exchange rates

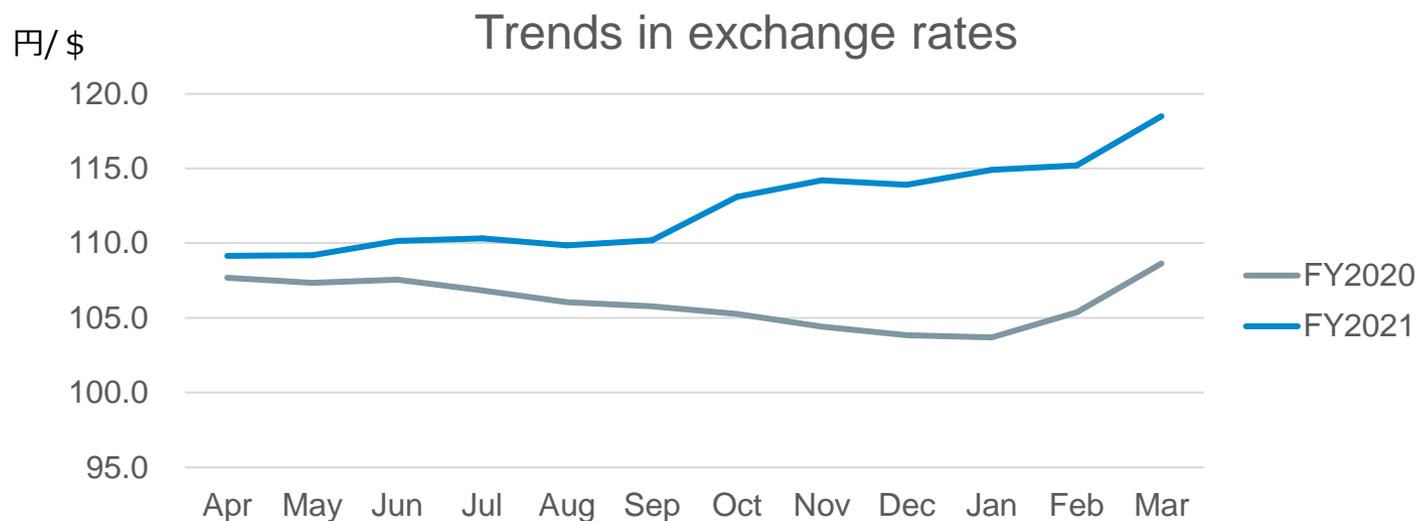
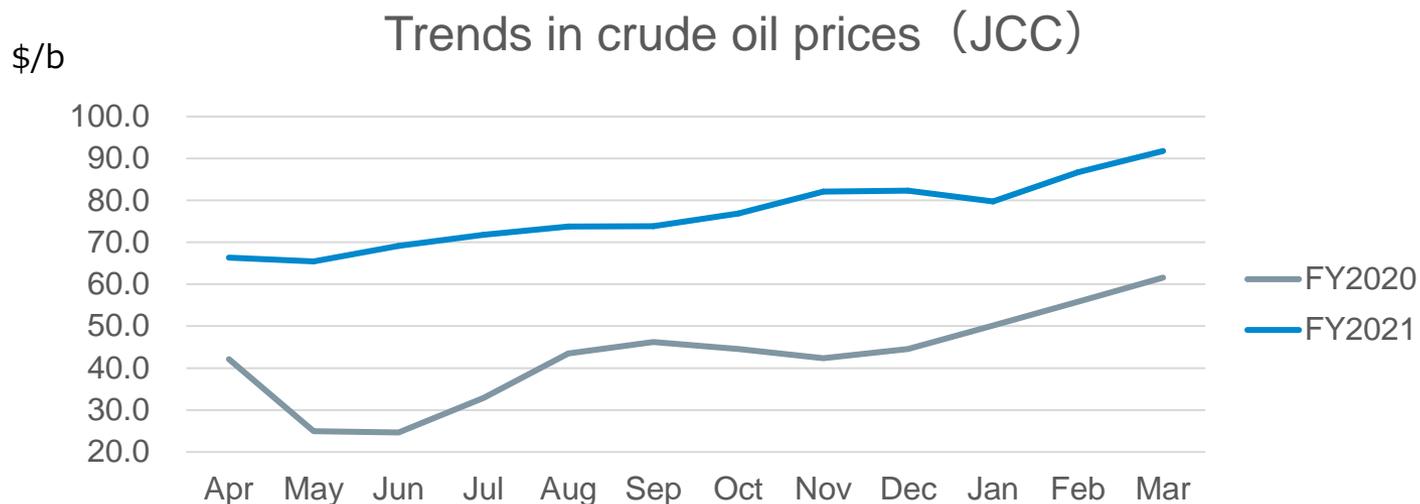
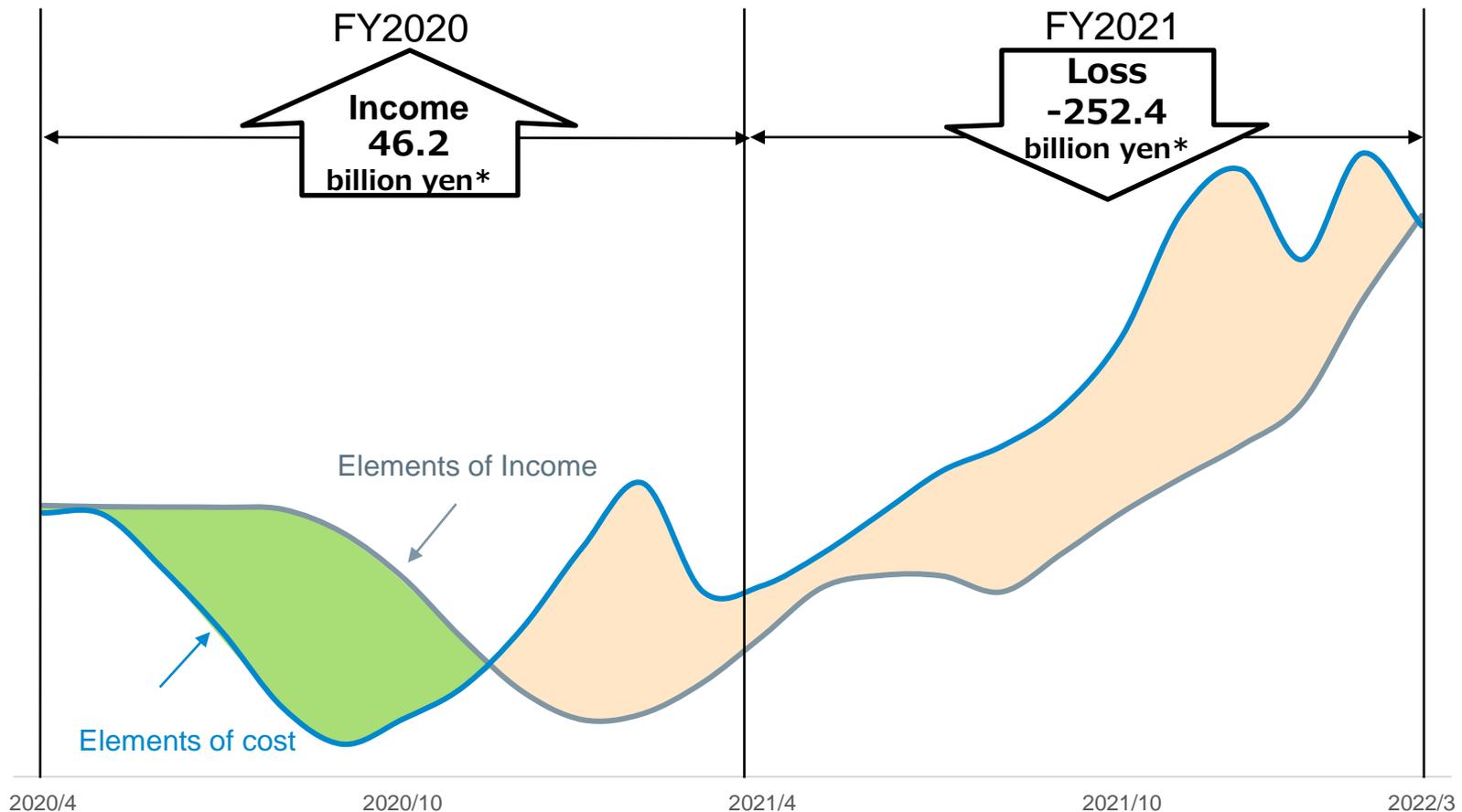


Image of Time Lag (FY2020 - FY2021)

- Time lag is profits and losses due to the time difference between changes in fuel prices and their reflection in sales prices.
- The impact on profits and losses will be neutral in the medium to long term.



* Figures are after-tax amounts.

Electrical Energy Sold and Electrical Power Generated

【Electrical Energy Sold(TWh)】

	Apr 1 to Jun 30	Jul 1 to Sep 30	Oct 1 to Dec 31	Jan 1 to Mar 31	Total
FY2021	53.7	64.6	64.9	72.3	255.5
FY2020	47.5	62.4	66.5	70.2	246.6

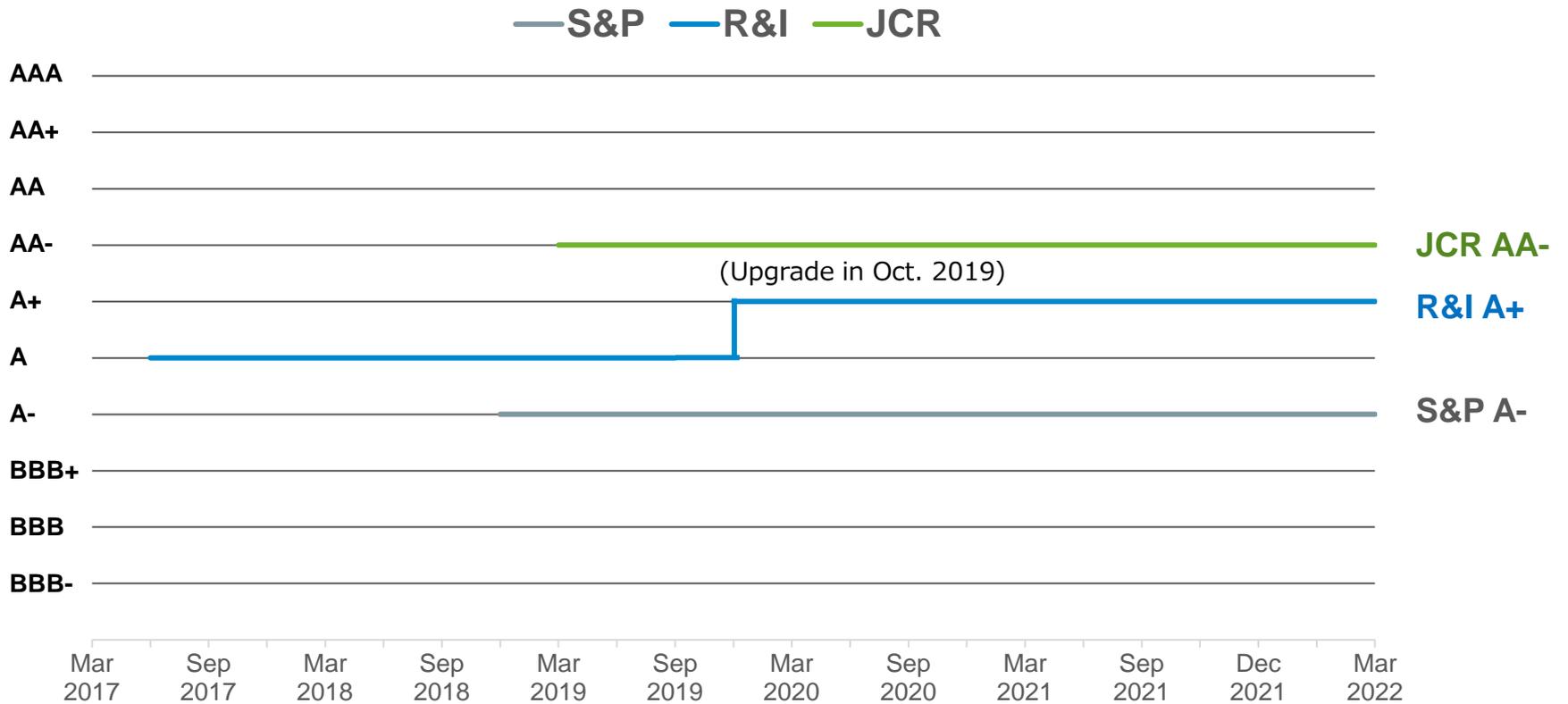
【Electrical Power Generated(TWh)】

	Apr 1 to Jun 30	Jul 1 to Sep 30	Oct 1 to Dec 31	Jan 1 to Mar 31	Total
FY2021	53.4	61.7	62.3	69.9	247.3
LNG	41.2 (77%)	46.8 (76%)	48.4 (78%)	55.8 (80%)	192.3 (78%)
Coal	12.2 (23%)	14.9 (24%)	13.8 (22%)	14.1 (20%)	55.0 (22%)
Others	0 (0%)	0 (0%)	0 (0%)	0% (0%)	0 (0%)
FY2020	47.0	61.7	66.0	70.0	244.6
LNG	38.4 (82%)	52.9 (86%)	54.5 (83%)	55.7 (80%)	201.5 (82%)
Coal	8.7 (18%)	8.8 (14%)	11.5 (17%)	14.2 (20%)	43.2 (18%)
Others	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

*The total may not match due to rounding.

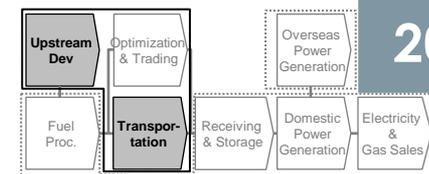
Credit Ratings

【 Issuer Credit ratings history 】



**Reference:
Overview and topics of
each segment**

Fuel-related Business: Overview of Fuel-related Business



[Fuel Upstream / Fuel Transportation Business]

- By leveraging the world's largest LNG transaction volume (FY2021: Approximately 37 million tons*) and participating in LNG upstream projects, we acquire Equity LNG and information that contributes to procurement and trading. Additionally, our ownership of upstream interests and fuel carriers contributes to our highly consistent, flexible, and competitive fuel supply.

*JERA Group as a whole

Upstream Project

Project Name	Address	LNG production / liquefaction capability	Our company Investment ratio *1
Darwin LNG Project	Australia	Approx. 3.7 million t/year	6.13%
Gorgon LNG Project	Australia	Approx. 15.6 million t/year	0.417%
Ichthys LNG Project	Australia	Approx. 8.9 million t/year	0.735%
Wheatstone LNG Project	Australia	Approx. 8.9 million t/year	Gas field: 10%, LNG plant: 8%
Freeport LNG Project(Train1)	United States	Approx. 4.64 million t/year	25%
Freeport LNG Development, L.P.*2	United States	Approx. 15.45 million t/year*3 for all three lines	25.7%

*1 The ratio of Wheatstone LNG Project represents the ratio of shares held through PE Wheatstone, in which we holds an equity stake

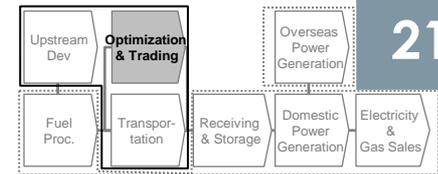
*2 Freeport LNG Project Management Company

*3 Including 4.64 million t/year from Train 1

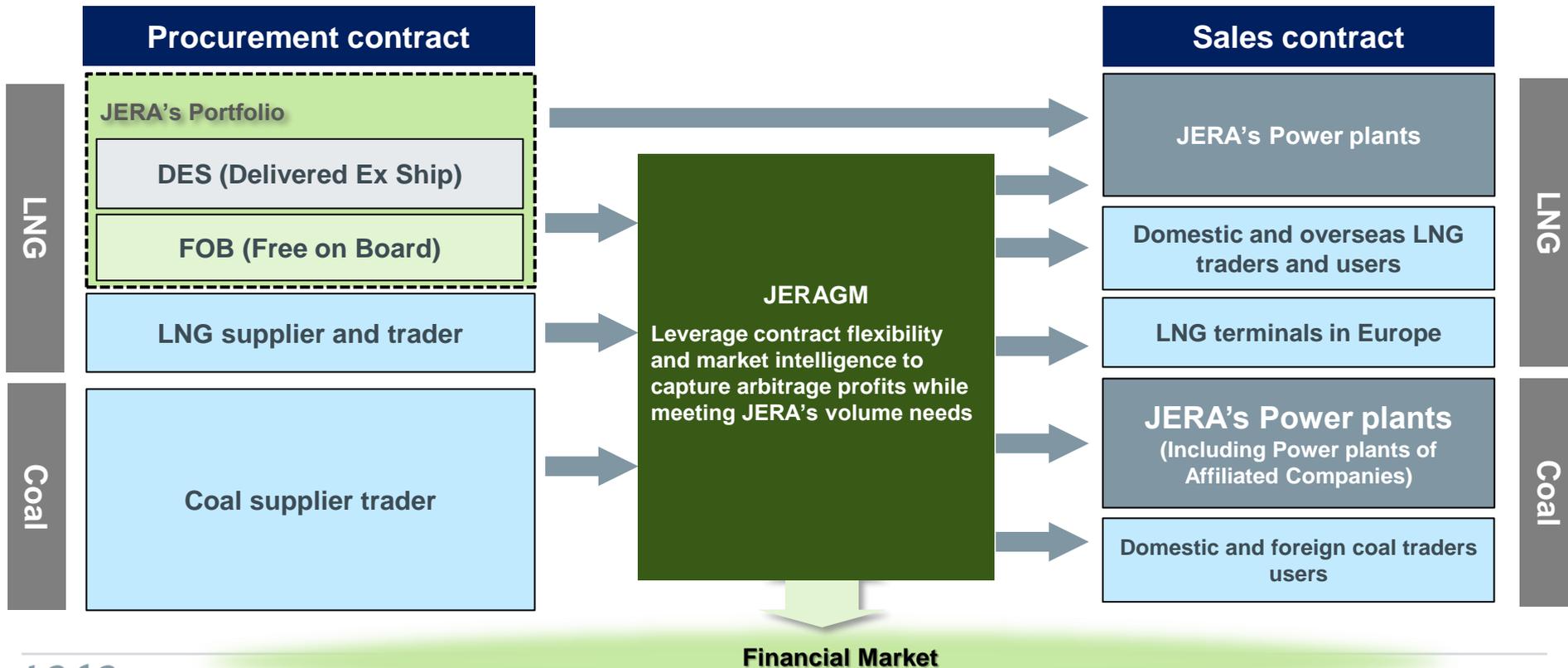
- Additionally, we decided to invest in the following project.
- The project is brownfield projects and development risks are limited. We will strive to secure and stable supply competitive LNG by leveraging full use of the knowledge and expertise we has accumulated through our LNG value chain business.

Project Name	Address	LNG production / liquefaction capability	Our company Investment ratio
Barossa/Caldita gas field Project	Australia	LNG production and liquefaction capacity is the same scale as Darwin LNG Project.	12.5%

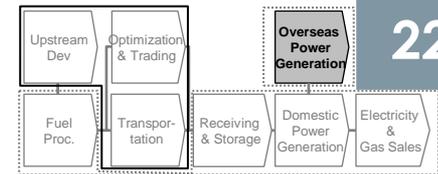
Fuel-related Business: Trading Business



- In addition to the Singapore headquarters, JERAGM has offices in the United Kingdom, the Netherlands, the United States, and Japan, and approximately 300 employees engage in asset-backed trading.
- Utilizing a global trading network, JERAGM meets the world's largest demand for LNG and coal in JERA's domestic power generation business. Leveraging this commercial flow, JERAGM has been able to achieve both the enhancement of supply stability and the expansion of profits by efficiently capturing profit opportunities through transactions with markets and third parties and by expanding the scale of transactions.
(FY2021 : Net income 127.1 billion yen, LNG sales volume approximately 19 million ton)
- JERAGM trades within the limited volume under the governance of the Board of Directors elected by shareholders.

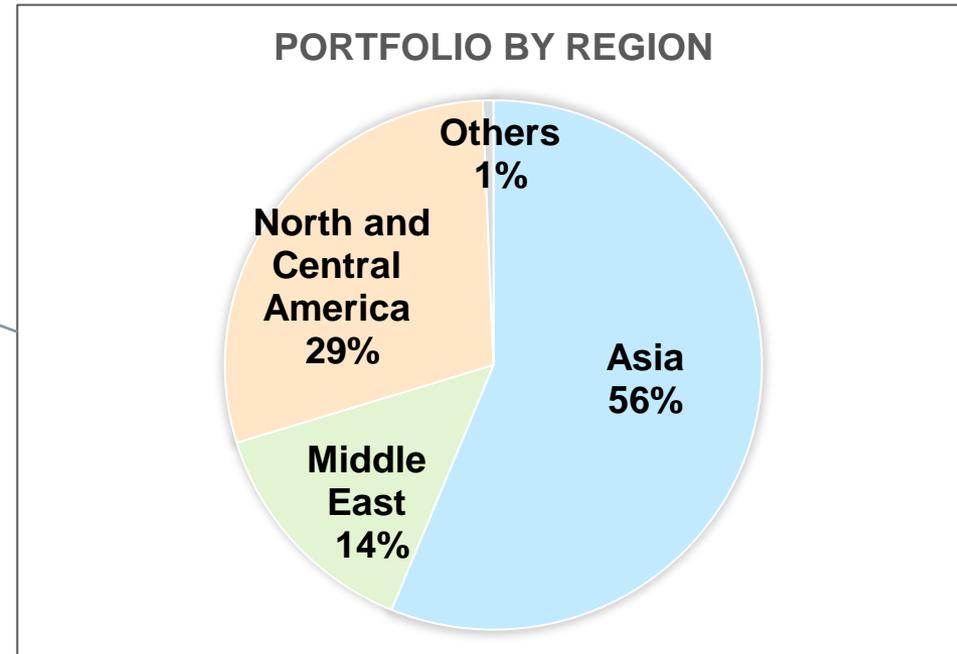
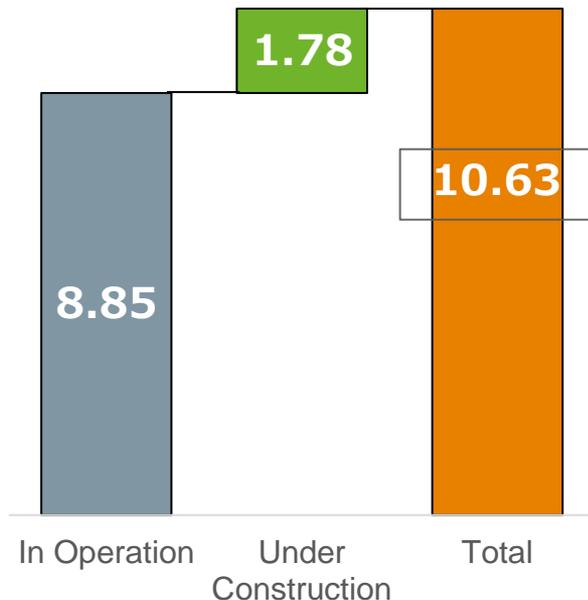


Overseas Power Generation Business: Portfolio of Overseas Power Generation Business



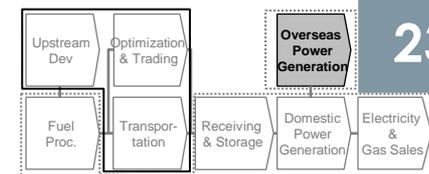
- JERA is expanding its businesses across the world through the experience gained from existing projects around the world. Total capacity of power generation in overseas projects is 10.63 GW (including under construction).
- JERA sold the shares in Indonesia’s PT Paiton Energy in August 2021 and Cogeneration Projects at Industrial Estates in Thailand in December 2021. We also plans to sell shares in Falcon Gas Thermal Power Co. in Mexico. JERA will change the portfolio through the sale and reinvestment of assets, aiming to achieve an optimal asset structure in line with changes in the business environment and expand earnings.
- JERA invested in Aboitiz Power Corporation, a major power company in the Philippines in December 2021. Increase JERA’s presence in the energy sector in the country and accelerate decarbonization there.

< Power generation capacity (As of March 31, 2022)>
(GW)



Overseas Power Generation Business:

List of overseas power generation projects (1)



23

(As of Mar 31, 2022)

Investment on Platform Companies* *Companies participating in multiple power generation projects

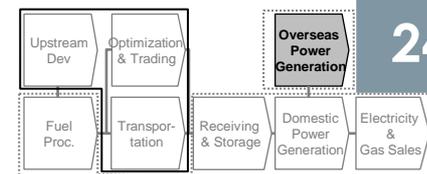
Country	Project Name	Investment ratio	Capacity	Fuel type	Notes
Philippines	TeaM Energy IPP	10.0%~50.0%	3,592 MW	Coal/Gas	
Philippines	Aboitiz Power Corporation	27%	4,573 MW	Coal/Oil/Renewable	Including under construction
Thailand	EGCO Corporation	12.3%	5,959 MW	Coal/Gas/Renewable	Including under construction
India	ReNew Company	6.7%	9,812 MW	Solar Power/Wind Power/Hydro power	Including under construction
Bangladesh	Summit Power IPP	22.0%	2,418 MW	Gas	Including under construction
United Kingdom	Zenobe Battery Storage	9.9%	73 MW	-	

IPP Projects (1/2)

Taiwan	Chang Bin/Fong Der/Star Buck Gas Thermal IPP	19.5%~22.7%	1,960 MW	Gas	
Taiwan	Formosa 1 Offshore Wind IPP	32.5%	128 MW	Offshore Wind	
Taiwan	Formosa 2 Offshore Wind IPP	49.0%	376 MW	Offshore Wind	Under construction
Vietnam	Phu My Gas Thermal IPP	15.6%	715 MW	Gas	
Indonesia	Cirebon2 Coal Thermal IPP	10.0%	1,000 MW	Coal	Under construction
Thailand	AT Biopower Rice Husk Biomass Thermal IPP	34.0%	20 MW	Biomass	
Thailand	Ratchaburi Gas Power Thermal IPP	15.0%	1,400 MW	Gas	

Overseas Power Generation Business:

List of overseas power generation projects (2)



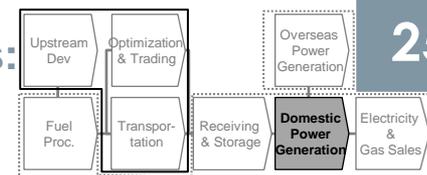
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(As of Mar 31, 2022)

IPP Projects (2/2)

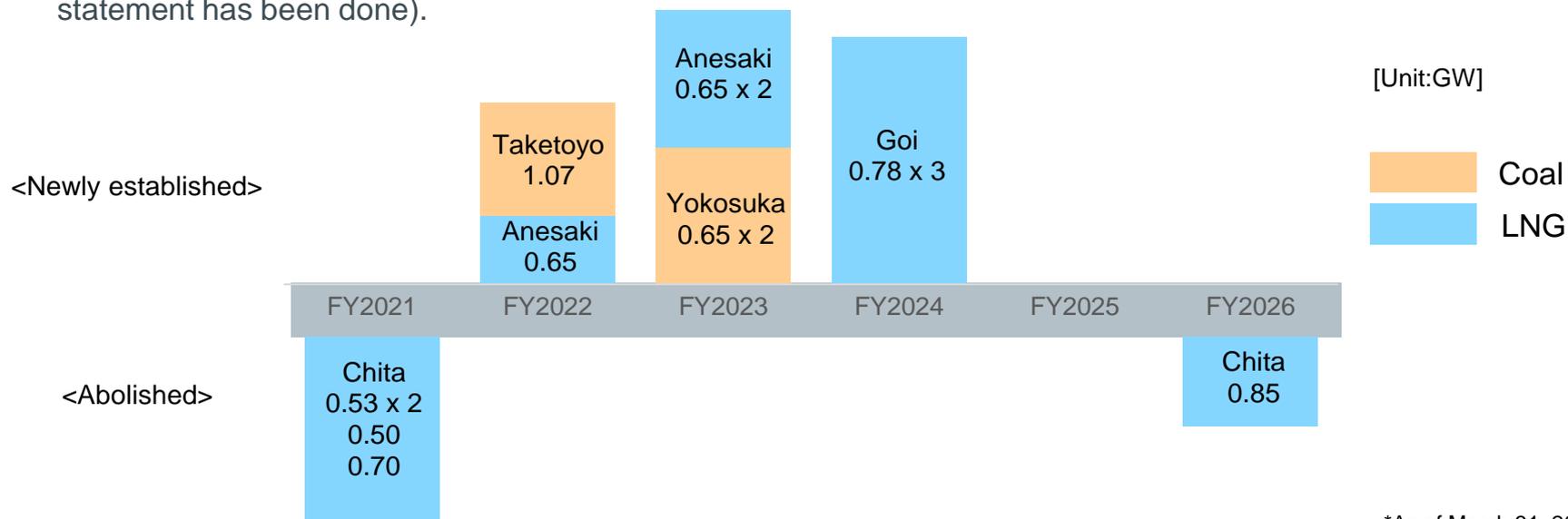
Country	Project Name	Investment ratio	Capacity	Fuel type	Notes
Thailand	Solar Power IPP	49.0%	31 MW	Solar Power	
Thailand	Wind Power IPP	5.0%	180 MW	Wind Power	
Bangladesh	Meghnaghat Gas Thermal IPP	49.0%	718 MW	Gas	Under construction
UAE	Umm Al Nar Gas Thermal IWPP	20.0%	2,200 MW	Gas	
Qatar	Ras Laffan B Gas Thermal IWPP	5.0%	1,025 MW	Gas	
Qatar	Ras Laffan C Gas Thermal IWPP	5.0%	2,730 MW	Gas	
Qatar	Mesaieed Gas Thermal IPP	10.0%	2,007 MW	Gas	
Qatar	Umm Al Houl Gas Thermal IWPP	10.0%	2,520 MW	Gas	
Oman	Sur Gas Thermal IPP	19.5%	2,000 MW	Gas	
Mexico	Valladolid Gas Thermal IPP	50.0%	525 MW	Gas	
Mexico	Falcon Gas Thermal IPP	20.0%	2,233 MW	Gas	Scheduled to be sold
United States	Tenaska Gas Thermal IPP	11.1%~17.5%	2,950 MW	Gas	
United States	Carroll County Gas Thermal IPP	20.0%	702 MW	Gas	
United States	Cricket Valley Gas Thermal IPP	38.0%	1,100 MW	Gas	
United States	Linden Gas Thermal IPP	50.0%	972 MW	Gas	
United States	Compass Gas Thermal IPP	50.0%	1,123 MW	Gas	
United States	El Sauz Onshore Wind IPP	100.0%	302 MW	Onshore Wind	Under construction
United Kingdom	Gunfleet Sands Offshore Wind IPP	25.0%	173 MW	Offshore Wind	

Domestic Thermal Power Generation and Gas Supply Business: Progress of Replacement of Thermal Power Plants in Japan



Replacement Plan

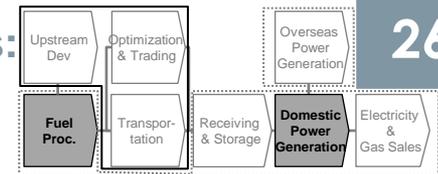
- Shifting to the latest high-efficiency thermal power generation facilities at four locations: Anesaki, Taketoyo, Yokosuka and Goi.
- Unit 1 to 4 of Chita Thermal Power Station were abolished in FY2021 and Unit 5 is planned to be abolished in FY2026. Construction of Unit 7 and 8 is under consideration (Process of environmental impact assessment statement has been done).



*As of March 31, 2022

Development point	Status of development
Anesaki	Full-scale construction started in February 2020. Construction progress rate of 73%
Yokosuka	Full-scale construction started in August 2019. Construction progress rate of 66%
Goi	Full-scale construction started in April 2021. Construction progress rate of 33%
Taketoyo	Full-scale construction started in April 2018. Construction progress rate of 99%

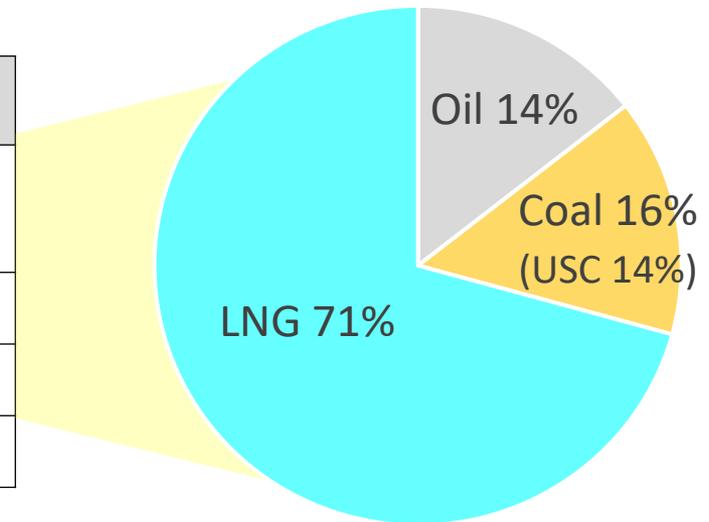
Domestic Thermal Power Generation and Gas Supply Business: Composition of Power Sources



- Our power generation composition is characterized by a large share of LNG, which emits less CO₂.
- In coal, ultra super critical power generation system (USC), which emits comparatively small CO₂, accounts for a large proportion. We will shut down all inefficient coal power plants by 2030*¹.

Composition of Power sources*²

Fuel	Capacity (Generator output)
Coal (USC)	10.32 GW (8.92 GW)
LNG* ³	46.44 GW
Oil	9.00 GW
Total	65.76 GW



*¹ Press release on October 13, 2020 “Towards Zero CO₂ Emissions in 2050”

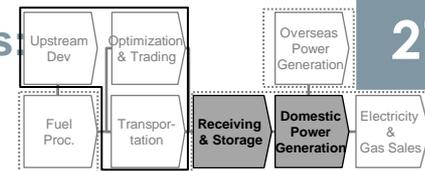
https://www.jera.co.jp/english/information/20201013_539

*² As of March 31, 2022. Includes capacity under construction.
Excludes capacity of affiliates.

*³ Includes LPG and City Gas.

Domestic Thermal Power Generation and Gas Supply Business

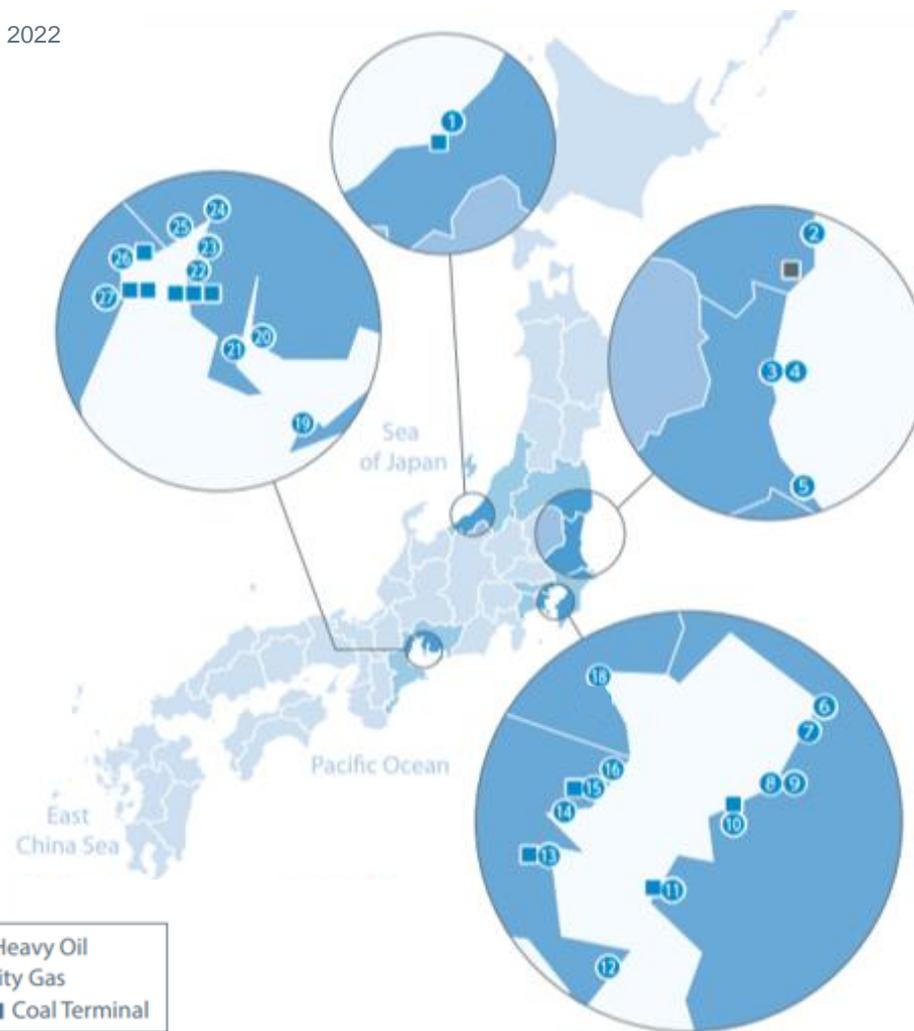
Domestic Thermal Power Plants



List of Thermal Power Plants in Japan¹ (Total output and fuel type listed for each thermal power plant)

As of March 31, 2022

① Joetsu	2.38 GW	◆
② Hirono	4.40 GW	◆◆◆
③ Hitachinaka	2.00 GW	◆
④ Hitachinaka Kyodo <HITACHINAKA GENERATION>	0.65 GW	◆
⑤ Kashima	5.66 GW	◆◆◆
⑥ Chiba	4.38 GW	◆
⑦ Goi <GOI UNITED GENERATION> *Scheduled to start operation in FY2024	2.34 GW	◆
⑧ Anegasaki	1.20 GW	◆
⑨ Anegasaki <JERA Power ANEGASAKI> *Scheduled to start operation in FY2023	1.941 GW	◆
⑩ Sodegaura	3.60 GW	◆
⑪ Futtsu	5.16 GW	◆
⑫ Yokosuka <JERA Power YOKOSUKA> *Scheduled to start operation in FY2023	1.30 GW	◆
⑬ Minami-Yokohama	1.15 GW	◆
⑭ Yokohama	3.016 GW	◆
⑮ Higashi-Ohgishima	2.00 GW	◆
⑯ Kawasaki	3.42 GW	◆
⑰ Shinagawa	1.14 GW	◆
⑱ Atsumi	1.40 GW	◆◆
⑳ Hekinan	4.10 GW	◆
㉑ Taketoyo <JERA Power TAKETOYO> *Scheduled to start operation in FY2022	1.07 GW	◆
㉒ Chita	1.708 GW	◆
㉓ Chita Daini	1.708 GW	◆
㉔ Shin-Nagoya	3.058 GW	◆
㉕ Nishi-Nagoya	2.376 GW	◆
㉖ Kawagoe	4.802 GW	◆
㉗ Yokkaichi	0.585 GW	◆



◆ LNG ◆ Coal ◆ Heavy Oil
◆ Crude Oil ◆ Utility Gas
■ LNG Terminal² ■ Coal Terminal

1 Power plant's name <Operator's name>

2 Includes jointly operated terminals in the Chita and Yokkaichi areas

**Reference:
Progress of
JERA Zero CO₂ Emissions 2050**

JERA Zero CO₂ Emissions 2050: Efforts to Achieve Zero CO₂ Emissions in JERA's Value Chain

- JERA is participating in business throughout the value chains, from fuel upstream development, transportation, and storage and to the power generation and electricity sales. We are working with many countries and companies around the world to achieve zero emissions at each stage.



Fuel upstream development

Fuel upstream development Fuel

- Collaborate with leading companies in Japan and overseas to build supply chains for ammonia and hydrogen (Details on page 30)
- Conduct feasibility studies on CO₂ capture and methanation in the United States
- Research and development of innovative ammonia synthesis catalysts to support establishment of fuel ammonia supply chains
- Conduct international competitive bidding for procurement of fuel ammonia



Transportation and storage

Fuel transportation



Fuel receiving and storage

- Investment in Hydrogenious LOHC Technologies GmbH, a developer of hydrogen storage and transportation technologies



Power generation and sales

Power generation



Electricity sales

- Commencement of verification on demonstration project for ammonia co-firing and co-firing rate improvement technology at Hekinan thermal power station
- Commencement of verification on development and demonstration project for ammonia combustion burner suitable for coal boilers
- Start of hydrogen demonstration project at domestic LNG thermal power plant
- Consideration of hydrogen utilization at Unit 6 of the Linden gas-fired power station in the United States



Renewable energy development

- Consideration of offshore wind power development in Hokkaido, Aomori, Yamagata and Akita prefectures
- Participation in Gunfleet Sands offshore wind farm in the United Kingdom and Formosa 1~3 offshore wind farm in Taiwan
- Adoption of technology verification project for reducing cost of floating offshore wind power generation using TLP system
- Investment in ReNew Power Limited, a renewable energy power generation company in India
- Development of onshore wind power and solar power generation in North America
- Participation in US El Sauz Wind Power Project in the United States
- Final agreement on business alliance with West Holdings Corporation
- Investment in Zenobē Energy Limited, a UK storage cell operator
- Start of demonstration of energy storage system data platform

JERA Zero CO₂ Emissions 2050: Efforts towards Zero CO₂ Emissions Thermal Power Generation (1)

Initiatives for Ammonia Co-firing

➤ The following projects have been adopted by NEDO and are currently being implemented

Project	Development of technologies for carbon recycling and next-generation thermal power generation / Research, development and demonstration of technologies for ammonia co-firing thermal power generation	Green Innovation Fund Program / Establishment of Fuel Ammonia Supply Chains project / Demonstration project to develop technology to increase the ammonia co-firing rate at coal-fired boilers
Overview	<ul style="list-style-type: none"> At Hekinan Thermal Power Station Unit 4 (power output: 1 million kW), JERA will aim to achieve 20% co-firing of ammonia by FY2024. In addition, small-scale tests using burners of different materials has been conducted at Unit 5 of Hekinan Thermal Power Station (power output: 1 million kW).  <p>Hekinan Thermal Power Station</p>	<ul style="list-style-type: none"> Ammonia high co-firing burners will be implemented in Hekinan Thermal Power Station Units 4 or 5, with the aim of increasing the ammonia co-firing rate to 50% or more. JERA will plan to develop a burner capable of 50% or more ammonia co-firing by FY2024, and to start 50% or more ammonia co-firing in actual equipment by FY2028. JERA will plan to develop an ammonia-fired burner suitable for coal boilers and to demonstrate its operation with actual equipment. We have the plan to develop the burner that can exclusively co-fire ammonia by FY2024, and verify that two units of different boiler types can co-fired more than 50% ammonia by FY2028.

Initiatives for Hydrogen Co-firing

- Received notice of acceptance of “Demonstration project related to hydrogen utilization at an LNG thermal power plant in Japan” under Green Innovation Fund program lead by NEDO, and started evaluation of operational and environmental characteristics for hydrogen utilization at existing LNG thermal power plants in Japan from October 2021 to March 2026.
- Consideration of modifying the existing gas turbine at Unit 6 of Linden Gas Thermal Power plant in the United States for co-firing with hydrogen. We will proceed with remodeling of existing gas turbines, aiming of completing construction around 2022.

JERA Zero CO₂ Emissions 2050: Efforts towards Zero CO₂ Emissions Thermal Power Generation (2)

Building hydrogen and ammonia supply chain

- To build supply chains for ammonia and hydrogen, collaborating with leading companies in Japan and overseas.

Business Partners *Including partially owned companies	Contents
Petroleum Nasional Berhad (Petronas) (Malaysia)	Concluded MOU on cooperation in the decarbonization area (February 2021) and discussions are underway.
Yara International ASA (Norway)	Concluded MOU for development, etc. of blue ammonia production project (May 2021) and discussions are underway.
ADNOC (Abu Dhabi)	MOU signed jointly with INPEX and JOGMEC for cooperation in the production of clean ammonia (July 2021). Discussions are underway.
Hydrogenious LOHC Technologies GmbH (Germany)	Invested as lead investor in Hydrogenious, which has developed hydrogen storage and transportation technologies and has unique technologies for liquid organic hydrogen carriers (September 2021).
Yara International ASA (Norway) Idemitsu Kosan Co., Ltd. (Japan)	Concluded MOU (October 2021) with a view to building a domestic logistics network based at Idemitsu Kosan's Tokuyama factory and collaborating in the ammonia bunkering business there. Discussions are underway.
Kyushu Electric Power Co., Inc. (Japan) Chugoku Electric Power Co., Inc. (Japan)	Signed MOU to consider collaboration aimed at the adoption of hydrogen and ammonia as fuel for power generation (April 2022).
ENEOS Corporation (Japan) JFE Holdings, Inc. (Japan)	Concluded MOU and begun to discuss in detail the possibility of establishing a hydrogen and ammonia receiving and supply base, and developing a supply project at the Keihin Waterfront Area in Kanagawa Prefecture (April 2022).

Topics : International Competitive Bid for Procurement of Fuel Ammonia

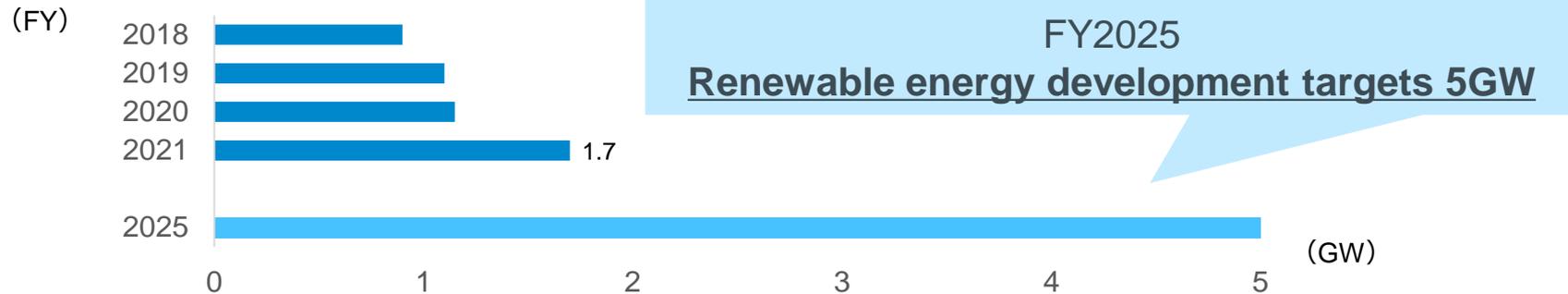
- As the demonstration project for the use of fuel ammonia at the Hekinan Thermal Station progressed smoothly. We have decided to consider fuel ammonia suppliers in parallel and to conduct an international competitive bid (February 2022).

< Main conditions >

Buyer	JERA
Supply period	Long-term contract from FY2027 into the 2040s
Quantity	Up to 500,000 tons per year
Delivery mode	FOB
Other	<ul style="list-style-type: none"> • As a rule, CO₂ is either not generated during ammonia production or is captured and stored. • JERA has the opportunity to participate in production projects

JERA Zero CO₂ Emissions 2050: Target of Wind and Renewable Energy Development and Topics

Status and Targets of Renewable Energy Development

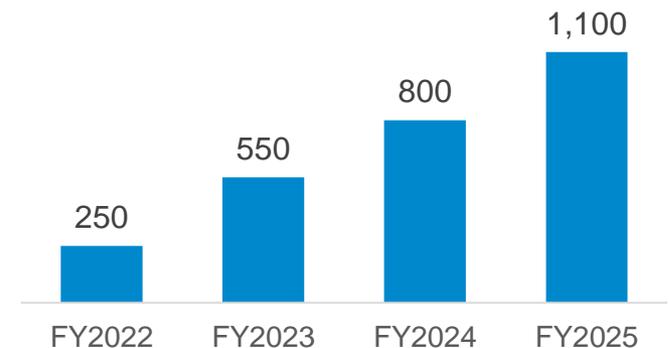


Topics : Final Agreement on Business Alliance with West HD

- Concluded final agreement on a business alliance with West Holdings Corporation for developing solar power generation projects in Japan. The contents are shown below.

- Both companies will develop solar power projects for JERA at new sites and at former JERA power plant sites in Japan (at least 1 GW over 4 years through the end of FY2025)
- JERA acquires approximately 2.3% of West HD's outstanding shares
- Both companies will explore joint solar power generation business opportunities for third parties in Japan and overseas

Forecast of Development Capacity through the Business Alliance Over Time (MW)



JERA Zero CO₂ Emissions 2050: Renewable Energy Development

Status of Offshore Wind Development

- The Akita Office is base of operations, which is currently implementing initiatives for domestic offshore wind development at the following locations and more.

Development sites	Power generation output	Status of development
Off Yuza in Yamagata Prefecture	Maximum 450 MW	• In the procedures for environmental impact assessment (Scoping Document)
Off the coast of Ishikari Bay, Hokkaido	Maximum 520 MW	• In the procedures for environmental impact assessment (Consideration Document)
Off the Happou town and city of Noshiro, Akita Prefecture	Maximum 356 MW	• In the procedures for environmental impact assessment (Consideration Document)
Off the city of southern Tsugaru, Aomori Prefecture	Maximum 600 MW	• In the procedures for environmental impact assessment (Consideration Document)

- JERA participates in three offshore wind projects at different stages and accumulating know-how in Taiwan, an advanced country in offshore wind power in Asia.

	Capacity	No. of generators	Commercial operation	Business partner
Formosa 1	128 MW	22 units	December 2019 *1	Orsted, Macquarie and Swankor
Formosa 2	376 MW	47 units	2022	Macquarie and Swankor
Formosa 3	2,004 MW *2	Undecided	2026 to 2030 (Target)	Macquarie and EnBW

*1 2 units (8 MW) started operation in April 2017 *2 Scheduled output



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