



エネルギーを新しい時代へ

FY2022 Second Quarter Investors Meeting

(Note) The company's fiscal year (FY) is from April 1 to March 31 of the following year in this material.
"2Q" refers to the period from April 1 to September 30.

JERA Co., Inc.

October 28, 2022

Outline of Financial Results

Consolidated Statement of Income

(Unit: Billion Yen)

	2022/2Q(A)	2021/2Q(B)	Change(A-B)	Rate of Change(%)
Operating revenue (Net sales)	3,917.0	1,590.8	2,326.2	146.2
Operating income / loss	-65.3	111.7	-177.0	—
Ordinary income / loss	-149.3	84.3	-233.6	—
Quarterly net income / loss attributable to owners of parent	-131.5	43.8	-175.4	—
<Reference>Net income excluding time lag	231.6	134.8	-96.7	71.7

Consolidated Balance Sheet

(Unit: Billion Yen)

	As of Sep 30,2022(A)	As of Mar 31,2022(B)	Change(A-B)	Rate of Change(%)
Assets	12,864.4	8,722.1	4,142.2	47.5
Liabilities	10,724.0	6,747.8	3,976.1	58.9
Net assets	2,140.4	1,974.3	166.0	8.4
Interest-bearing debt	3,570.0	2,646.5	923.4	34.9
Net DER (%)	1.66	1.18	0.48	

Key Points of Financial Results

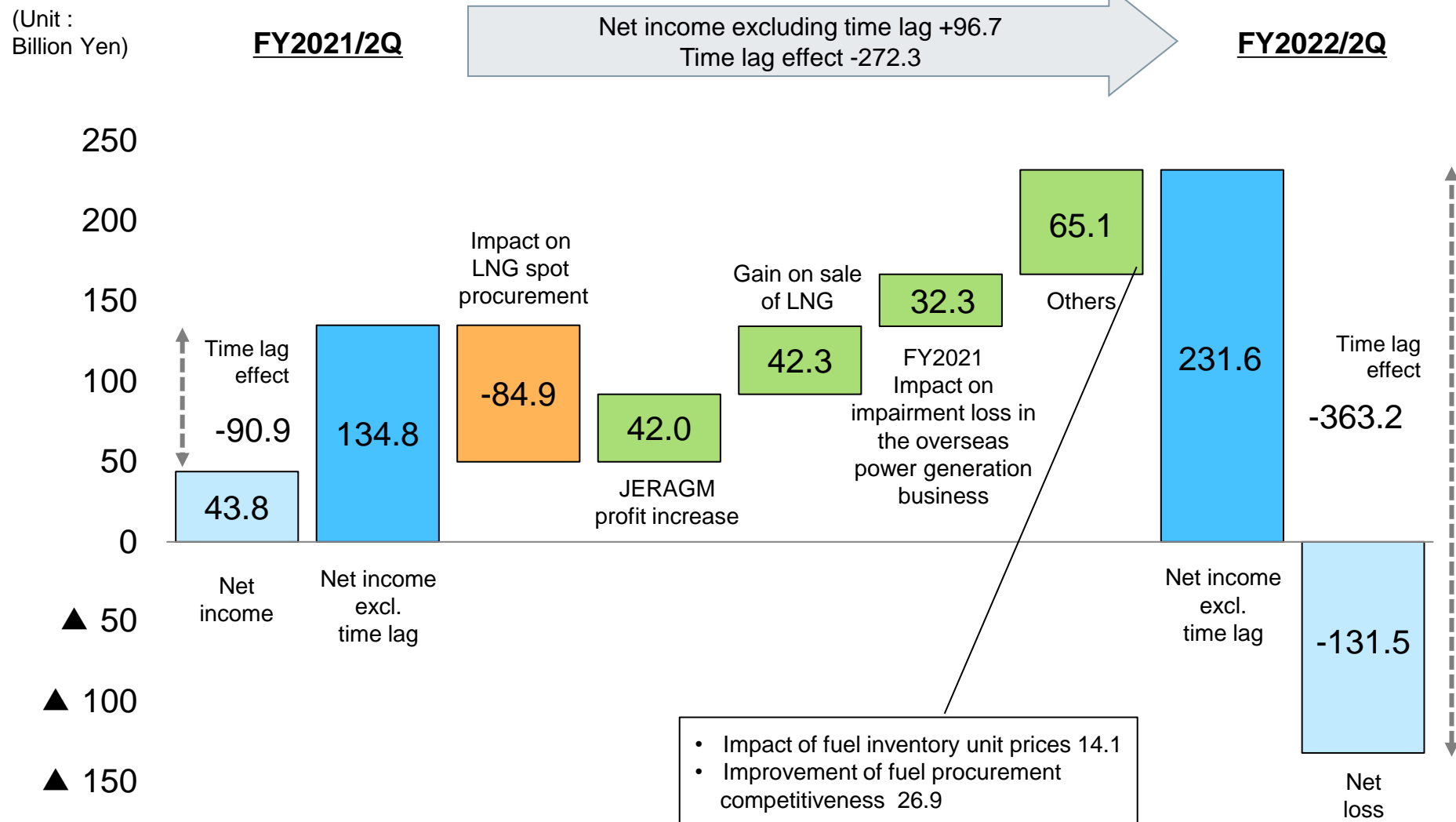
【Operating Revenue】

- Operating revenue **increased by 2,326.2 billion yen (up 146.2%) to 3,917.0 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 / loss **decreased by 175.4 billion yen from the same period last year 43.8 billion yen and fell into net loss of 131.5 billion yen.**
 - The losses from time lag significantly increased.
(-272.3 billion yen [-90.9 billion yen to -363.2 billion yen])
 - Net income excluding time lag increased.
(+96.7 billion yen [134.8 billion yen to 231.6 billion yen])
- Net income excluding time lag increased mainly due to utilization of optimization function of JERAGM, etc., despite the impact on LNG spot procurement.

Analysis of Consolidated net income / loss



Note: Figures are after-tax amounts.

Consolidated Statement of Income

(Unit: Billion Yen)

	2022/2Q(A)	2021/2Q(B)	Change(A-B)	Main Factors of Changes
Operating revenue (Net sales)	3,917.0	1,590.8	2,326.2	<ul style="list-style-type: none"> • Increase of electrical energy sold • Increase in sales of JERAGM
Operating expenses	3,982.4	1,479.1	2,503.3	<ul style="list-style-type: none"> • Increase of fuel costs • Increase in costs of JERAGM
Operating income / loss	-65.3	111.7	-177.0	
Non-operating income	25.3	5.3	19.9	
Non-operating expenses	109.2	32.7	76.5	<ul style="list-style-type: none"> • Exchange loss +88.6
Ordinary income / loss	-149.3	84.3	-233.6	<ul style="list-style-type: none"> • Increase of time lag loss -378.0(-126.3 → -504.4) • Increase of income excluding time lag +144.4(210.6 → 355.1)
Income taxes, etc.	-70.6	11.8	-82.4	
Quarterly net income attributable to non-controlling Interests	52.9	28.6	24.2	
Quarterly net income / loss attributable to owners of parent	-131.5	43.8	-175.4	

Key Elements

	2022/2Q(A)	2021/2Q(B)	Change(A-B)
Electrical Energy Sold(TWh)	127.8	118.3	9.5
Crude Oil Prices(JCC) (dollar/barrel)	111.9	70.3	41.6
Foreign Exchange Rate (yen/dollar)	134.0	109.8	24.2

Note: Crude Oil Prices(JCC) for FY2022/2Q is tentative.

Consolidated Balance Sheet

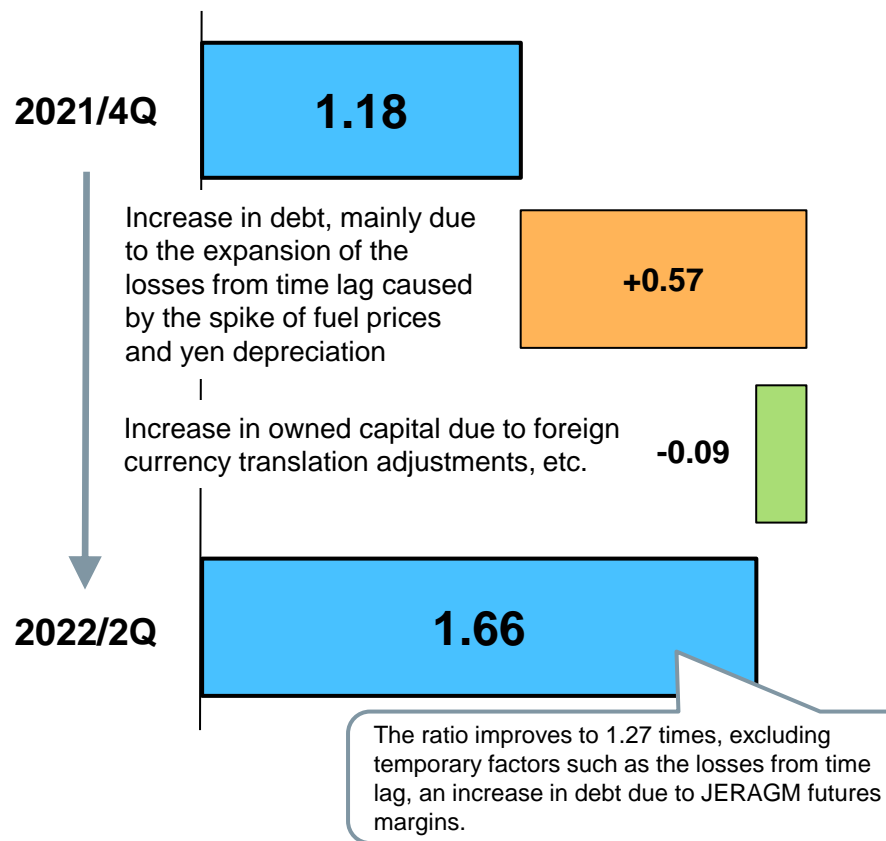
(Unit: Billion Yen)

	As of Sep 30,2022(A)	As of Mar 31,2022(B)	Change(A-B)	Main Factors of Changes
Cash and deposits	374.8	514.3	-139.4	
Property, plant and equipment	2,313.8	2,173.8	140.0	• Progress in replacing domestic thermal power plants, etc.
Investment securities	1,235.8	1,026.5	209.3	
Others	8,939.8	5,007.4	3,932.3	• Increase in derivative assets (JERAGM, etc.) +2,926.0
Assets	12,864.4	8,722.1	4,142.2	
Interest-bearing debt	3,570.0	2,646.5	923.4	• Borrowings +663.9 (Subsidiaries +388.4) • Commercial Paper +63.0 • Corporate Bonds +196.5
Others	7,153.9	4,101.2	3,052.7	• Increase in derivative liabilities (JERAGM, etc.) +2,556.0
Liabilities	10,724.0	6,747.8	3,976.1	
Shareholders' equity	1,473.4	1,688.1	-214.6	• Dividends paid -83.1 • Quarterly net income / loss -131.5
Others	666.9	286.2	380.7	• Foreign currency translation adjustments +238.2
Net Assets	2,140.4	1,974.3	166.0	

Current Status of Management Targets (Financial Soundness)

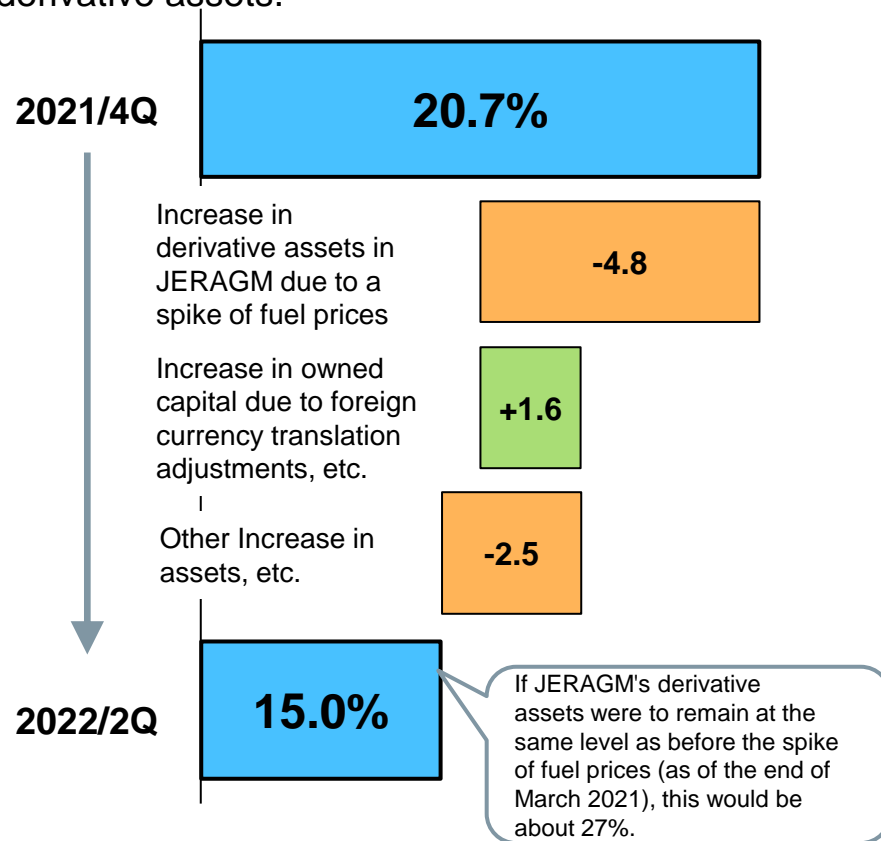
Net DER

The ratio deteriorated to 1.66 times from the end of FY2021, due to an increase in debt.



(Reference) Equity Ratio

The ratio deteriorated to 15.0% from the end of FY2021, due to an increase in total assets, including derivative assets.



Mostly attributable to the spike of fuel prices and yen depreciation, and are expected to improve in the medium to long term.

Consolidated Cash Flows

- Cash flows from operating activities deteriorated sharply due to a loss from time lag -504.4 billion yen, an increase in inventories -344.1 billion yen, and an increase in JERAGM futures margins -80.0 billion yen, which were mainly caused by a spike of fuel prices and yen depreciation. ^{*1} (Unit: Billion Yen)

		2022/2Q(A)	2021/2Q(B)	Change(A-B)
Cash flows from operating activities		-691.5	-12.8	-678.6
Cash flows from investing activities	Purchase of non-current assets	-213.7	-190.9	-22.8
	Purchase of investment securities	-9.5	-0.9	-8.6
	Others	-1.3	-36.8	35.5
		-224.6	-228.6	4.0
Free cash flows		-916.2	-241.5	-674.6
Cash flows from financing activities	Net increase/decrease in outstanding interest-bearing debt	836.5	159.3	677.1
	Dividends paid ^{*2}	-83.1	-33.4	-49.7
	Others	-19.5	-12.0	-7.4
		733.9	113.9	620.0
Net increase/decrease in cash and cash equivalents (minus indicates decrease)		-131.9	-120.0	-11.8

^{*1} Amounts represent the impact on cash flows for 2Q. ^{*2} Excluding Dividends paid to non-controlling interests

Segment Information

(Unit: Billion Yen)

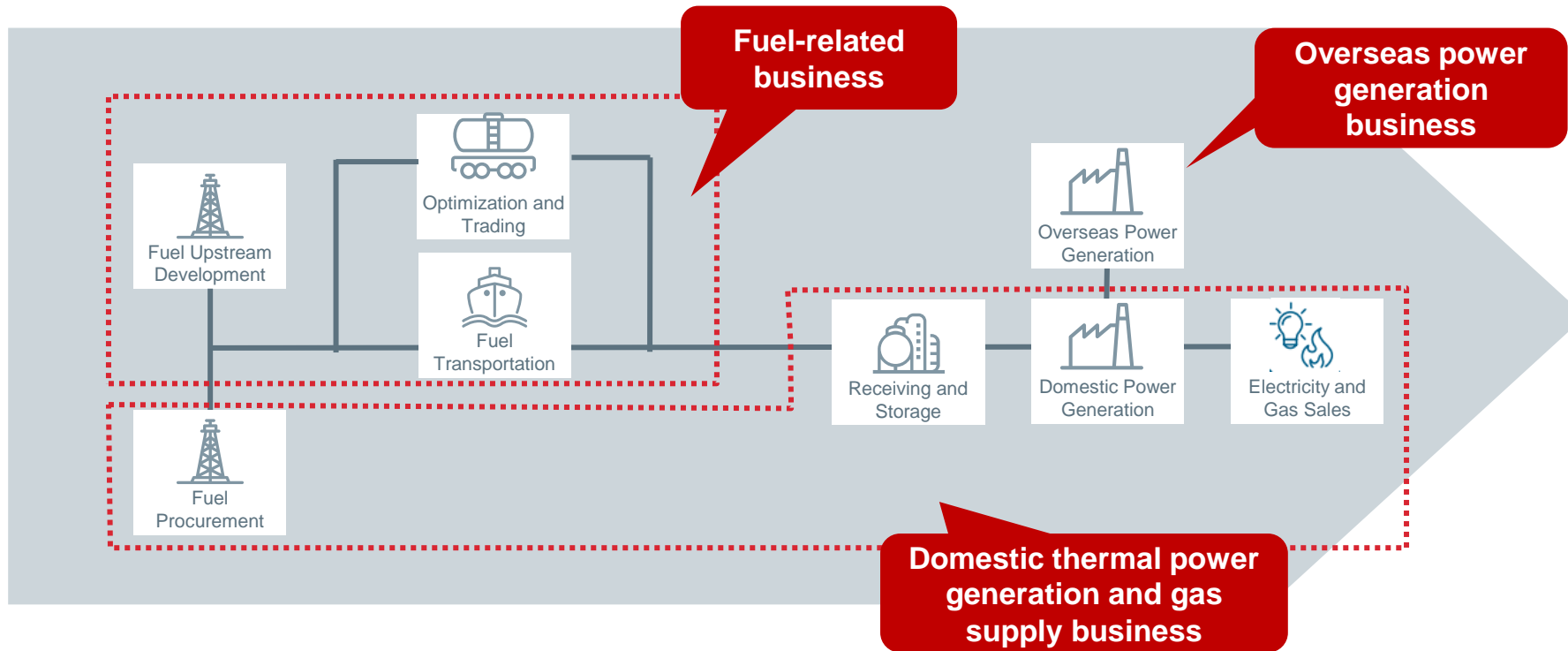
	2022/2Q (A)		2021/2Q (B)		Change (A-B)		Main Factors of Changes in Net Income
	Operating Revenue	Net Income / Loss	Operating Revenue	Net Income / Loss	Operating Revenue	Net Income / Loss	
Fuel Related *1	2,950.3	120.8	956.4	89.2	1,993.8	31.6	<ul style="list-style-type: none"> •JERAGM profit increase +42.0 •(2021) Impact on deep freeze on North America gas trading -8.4
Overseas Power Generation	2.2	-2.0	1.5	-33.0	0.7	30.9	<ul style="list-style-type: none"> •(2021) Impact on impairment loss in Formosa 2 +32.3 •Overseas IPP projects profit increase +0.9
Domestic Thermal Power Generation and Gas Supply	2,688.9	-203.6 159.6*2	1,188.9	17.0 108.0*2	1,499.9	-220.6 51.5*2	<ul style="list-style-type: none"> •Impact on LNG spot procurement -84.9 •Gain on sales of LNG +42.3 •Improvement of fuel procurement competitiveness +26.9 •Impact of fuel inventory unit prices +14.1
Adjustments	-1,724.3	-46.7	-556.0	-29.3	-1,168.3	-17.4	
Consolidated	3,917.0	-131.5 231.6*2	1,590.8	43.8 134.8*2	2,326.2	-175.4 96.7*2	

*1 Fuel upstream, transportation and trading

*2 Excluding the effect of 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

【Consolidated forecast】

- While net income / loss is expected to be -200.0 billion yen due to the impact of the fire at the Freeport LNG terminal (-110.0 billion yen) and an increase in the loss from time lag, net income excluding time lag is expected to be 100.0 billion yen.
- This forecast may fluctuate significantly depending on future fuel market conditions, changes in the required fuel procurement volume, and other factors.

(Unit: Billion Yen)

	FY2022 Forecast (A)	FY2021 Result (B)	Change (A-B)	Rate of Change (%)
Net Income / loss attributable to owners of parent	-200.0	24.6	Approx.224.6	-
Breakdown: Time lag	-300.0	-252.4	Approx.47.6	-
Income excluding time lag	100.0	277.0	Approx.177.0	-63.9

【Key Data】

	FY2022 Forecast	FY2021 Result
Crude Oil Prices(JCC) (dollar/barrel)	Approx.101	77.1
Foreign Exchange Rate (yen/dollar)	Approx.139	112.4

Appendix: Financial Results

Trends in crude oil price and exchange rates

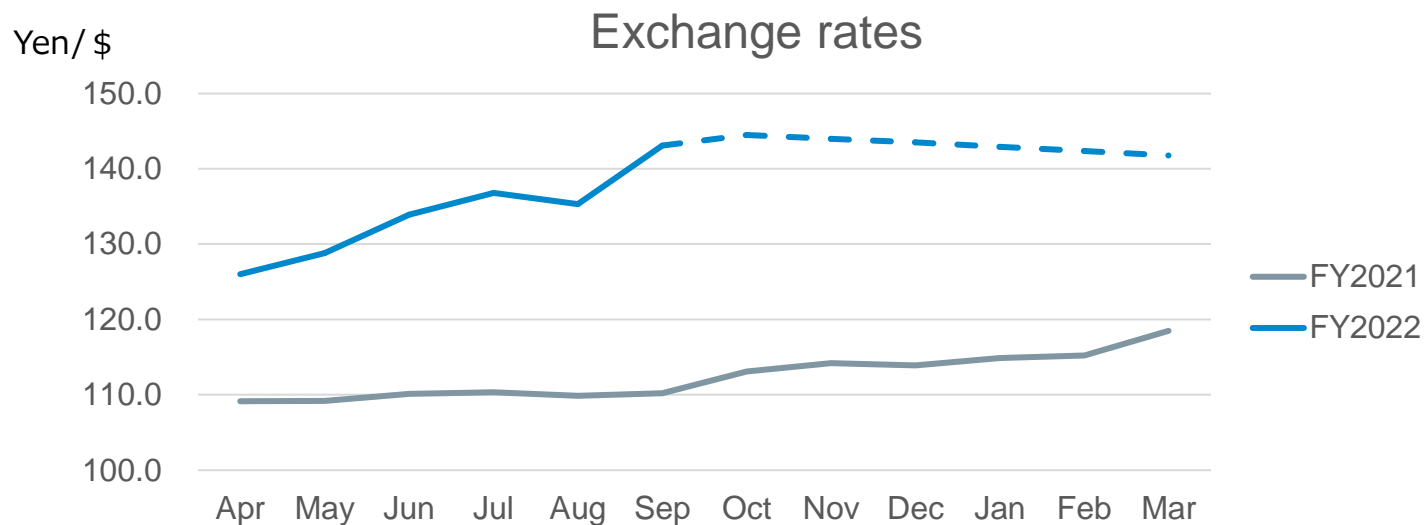
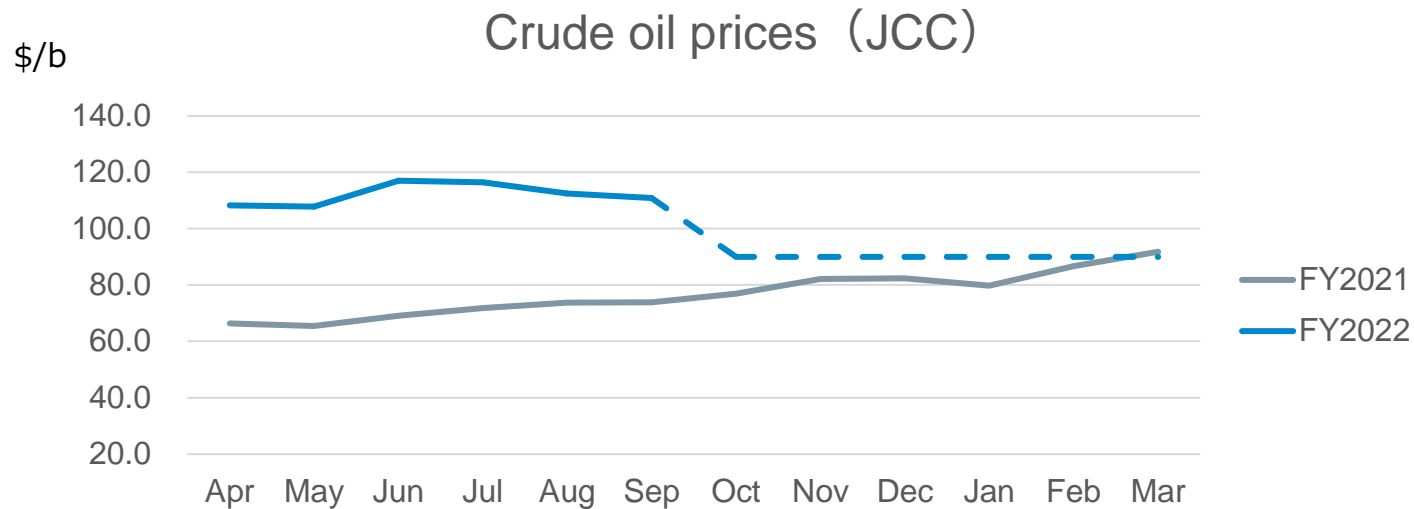
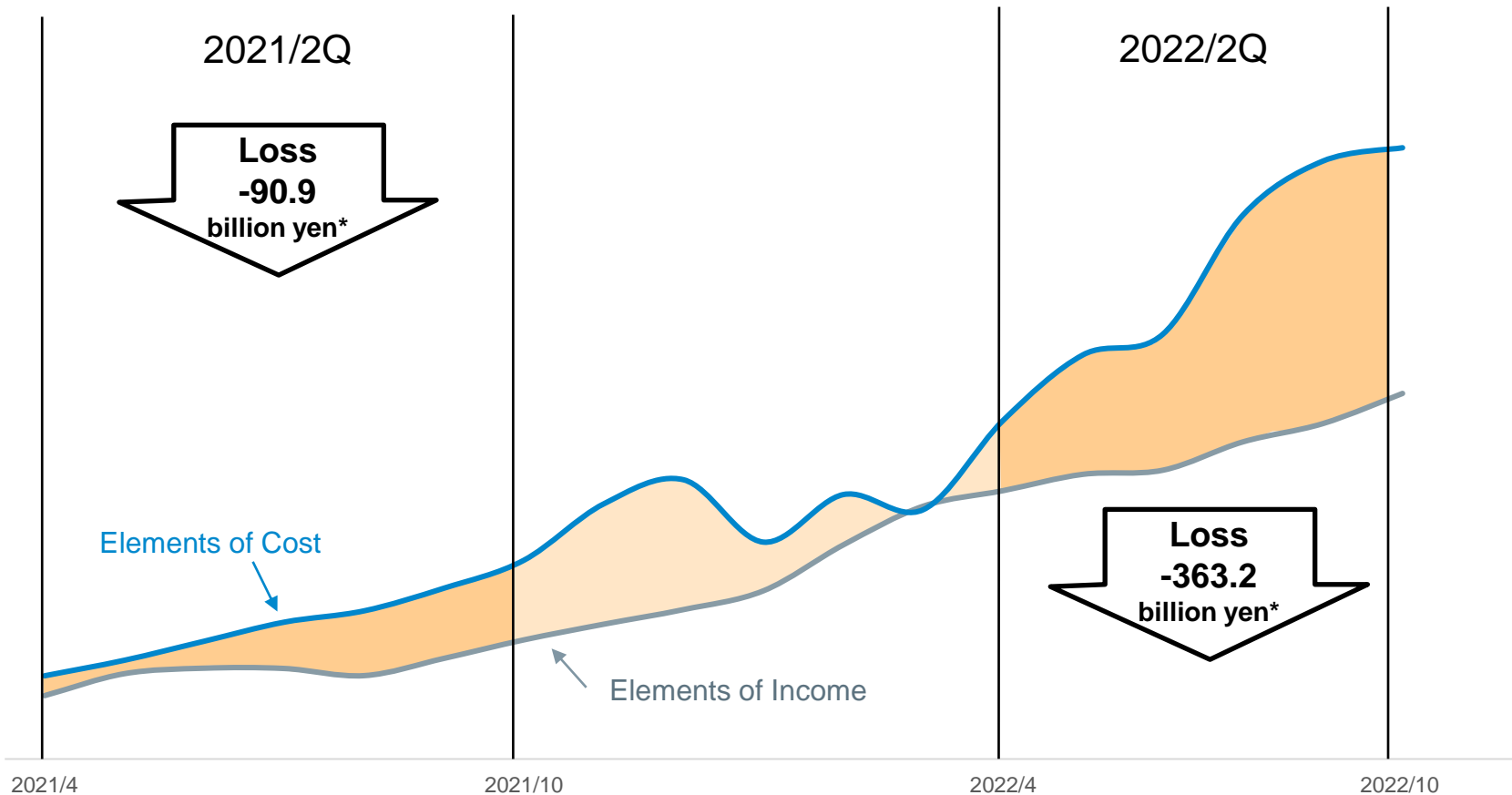


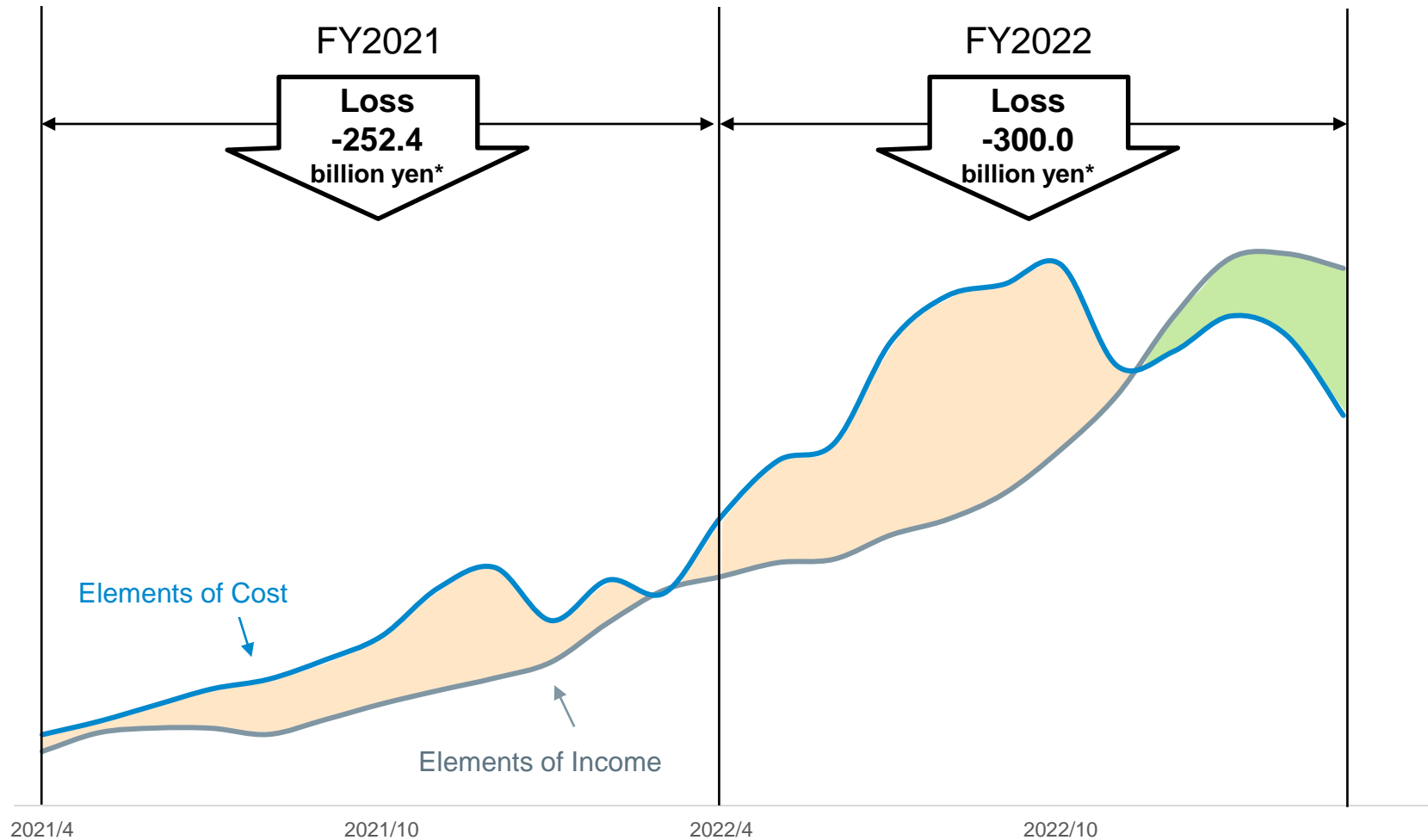
Image of Time Lag (2021/2Q – 2022/2Q)

- 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.

Image of Time Lag (FY2021 – FY2022)



* Figures are after-tax amounts.

Electrical Energy Sold and Electrical Power Generated

【Electrical Energy Sold(TWh)】

	Apr to Jun	Jul to Sep	Oct to Dec	Jan to Mar	Total
FY2022	57.9	69.9			127.8
FY2021	53.7	64.6	64.9	72.3	255.5

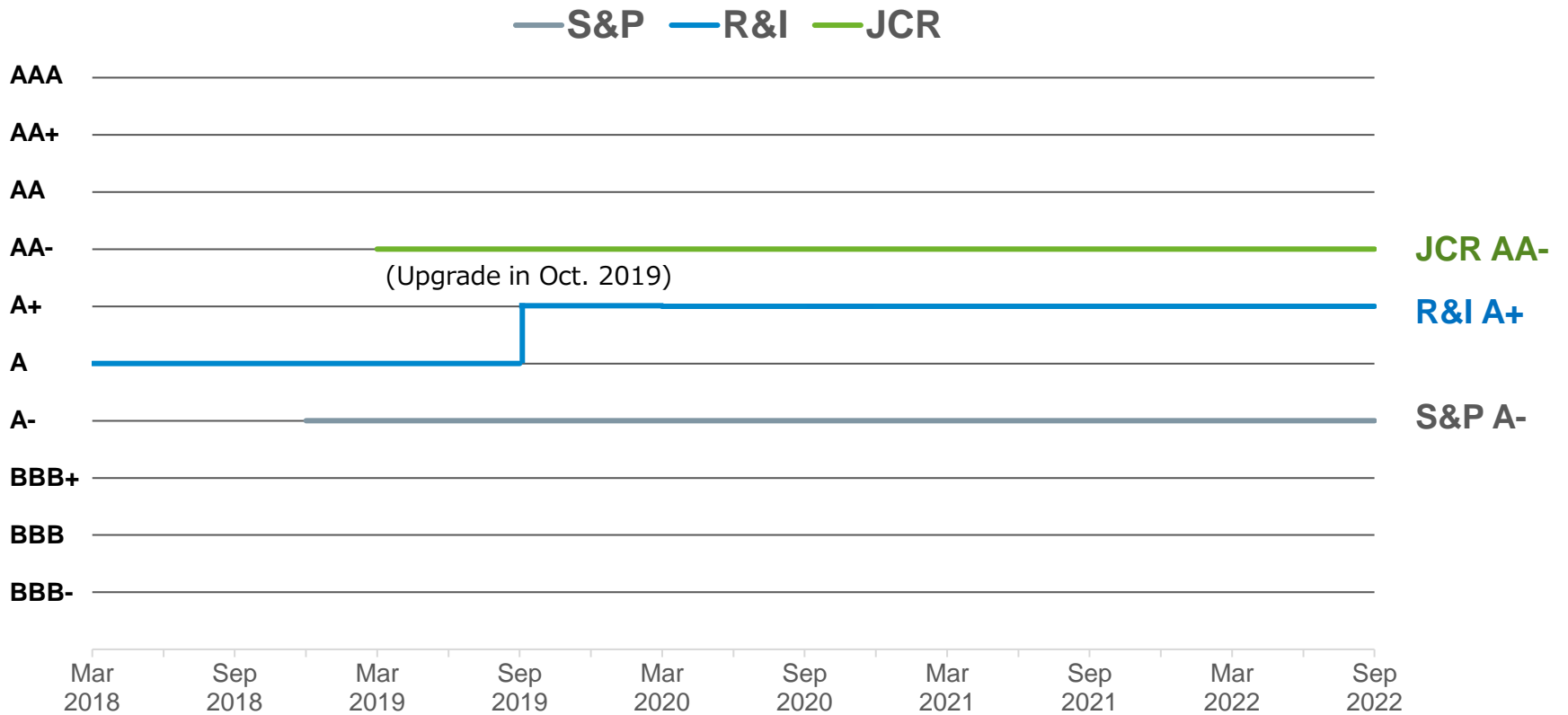
【Electrical Power Generated(TWh)】

	Apr to Jun	Jul to Sep	Oct to Dec	Jan to Mar	Total
FY2022	52.8	63.5			116.3
LNG	41.7 (79%)	47.0 (74%)			88.7 (76%)
Coal	11.2 (21%)	16.5 (26%)			27.7 (24%)
Others	0 (0%)	0 (0%)			0 (0%)
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%)

*The total may not match due to rounding.

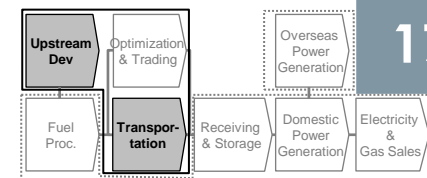
Credit Ratings

【 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	JERA’s stake *1
Darwin LNG Project	Australia	Approx. 3.7 million t/year	6.132%
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. 5.15 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 stake of Wheatstone LNG Project represents the ratio of shares held through PE Wheatstone which JERA invests in

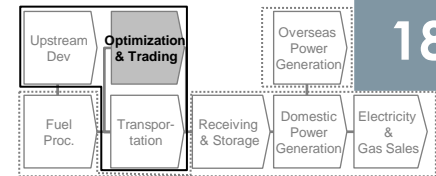
*2 Freeport LNG Project Management Company

*3 Including 5.15 million t/year from Train 1

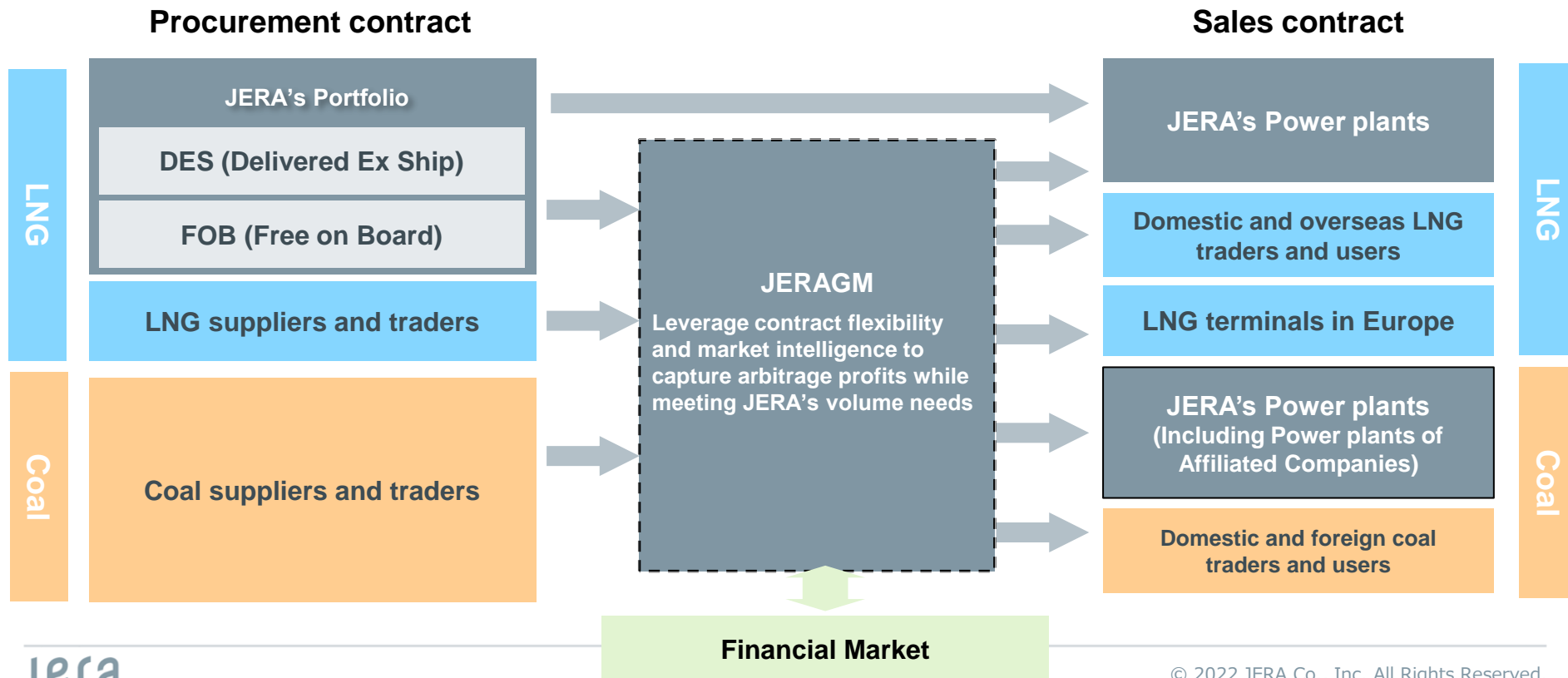
- Additionally, we invested in the following project.
- The project is brownfield projects and development risks are limited. We will strive to secure and stably supply competitive LNG by fully leveraging the knowledge and expertise we have accumulated through our LNG value chain business.

Project Name	Address	LNG production / liquefaction capability	JERA’s stake
Barossa gas field Project	Australia	LNG production and liquefaction capacity is the same scale as Darwin LNG Project.	12.5%

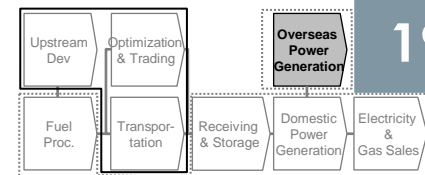
Fuel-related Business: Trading Business



- 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 transaction volume.
(FY2022 2Q : Net income 107.1 billion yen)
- JERAGM trades within the limited volume under the governance of the Board of Directors elected by shareholders.

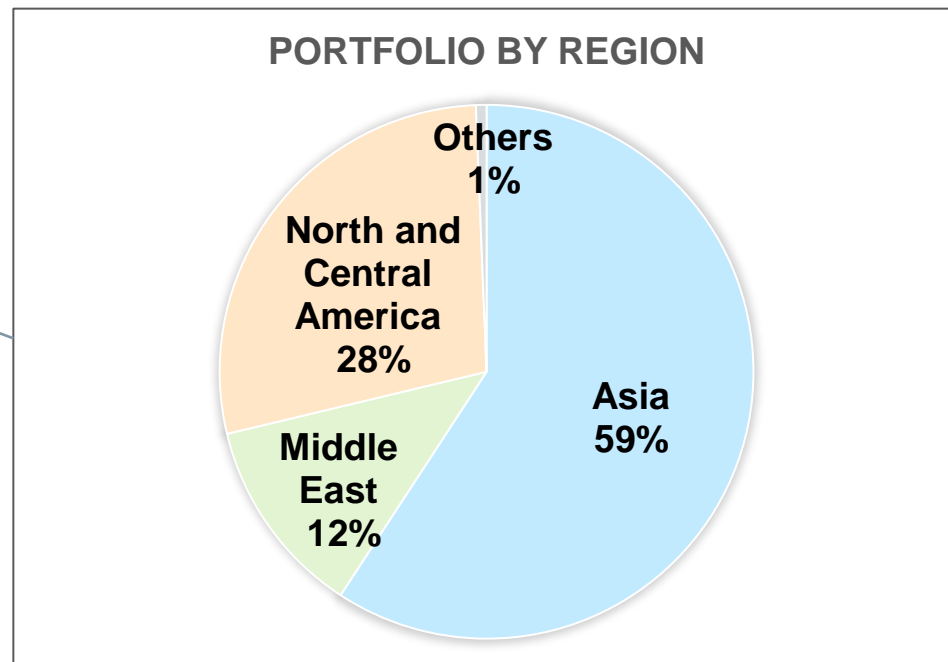
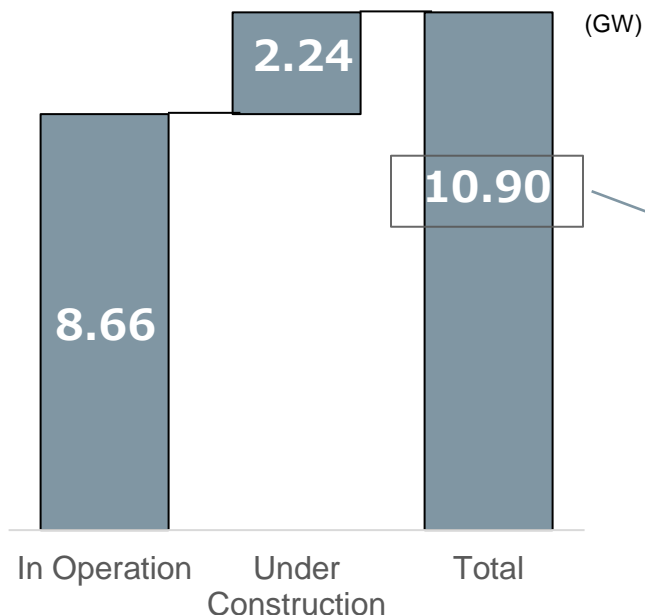


Overseas Power Generation Business: Portfolio of Overseas Power Generation Business



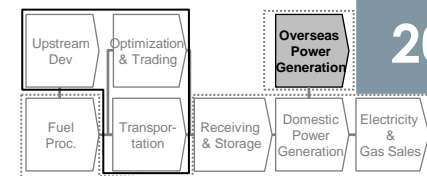
- JERA is expanding its businesses through the experience gained from existing projects around the world. Total capacity of power generation in overseas projects is 10.90 GW (including under construction).
- JERA plans to sell shares in Falcon Gas Thermal Power Co. in Mexico. JERA aims to secure funds and expand earnings by replacing its portfolio through the sale and reinvestment of assets to achieve an optimal asset structure in line with changes in the business.
- In August 2022, JERA has signed a share purchase agreement with the sellers to acquire approx. 35.1% of the outstanding shares of Gia Lai Electricity Joint Stock Company ("GEC"), a leading renewable energy power company in Vietnam. JERA intends to contribute to both decarbonization and the country's growth, while striving to expand its revenue base.

< Power generation capacity (As of September 30, 2022) >



Overseas Power Generation Business:

List of overseas power generation projects (1)



(As of September 30, 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	25.0%~50.0%	2,341 MW	Coal	
Philippines	Aboitiz Power Corporation	27%	4,806 MW	Coal/Oil/ Renewable	Including under construction
Thailand	EGCO Corporation	12.3%	6,071 MW	Coal/Gas/ Renewable	Including under construction
Vietnam	Gia Lai Electricity Joint Stock Company*	35.1%	538 MW	Solar/Wind/Hydro	Including under construction
India	ReNew Company	6.8%	13,151 MW	Solar/Wind/Hydro	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	-	

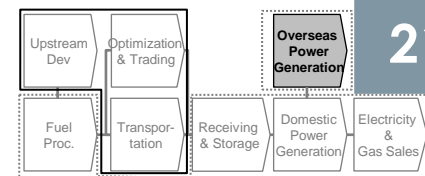
*In August 2022, share purchase agreement has been signed with the sellers

IPP Projects (1/2)

Taiwan	Chang Bin/Fong Der/Star Buck Gas Thermal IPP	19.5%~22.7%	3,060 MW	Gas	Including under construction
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	29.0%	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)



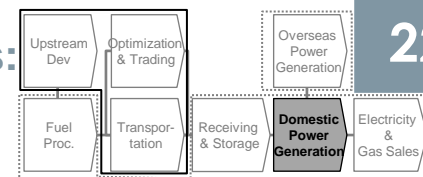
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(As of September 30, 2022)

IPP Projects (2/2)

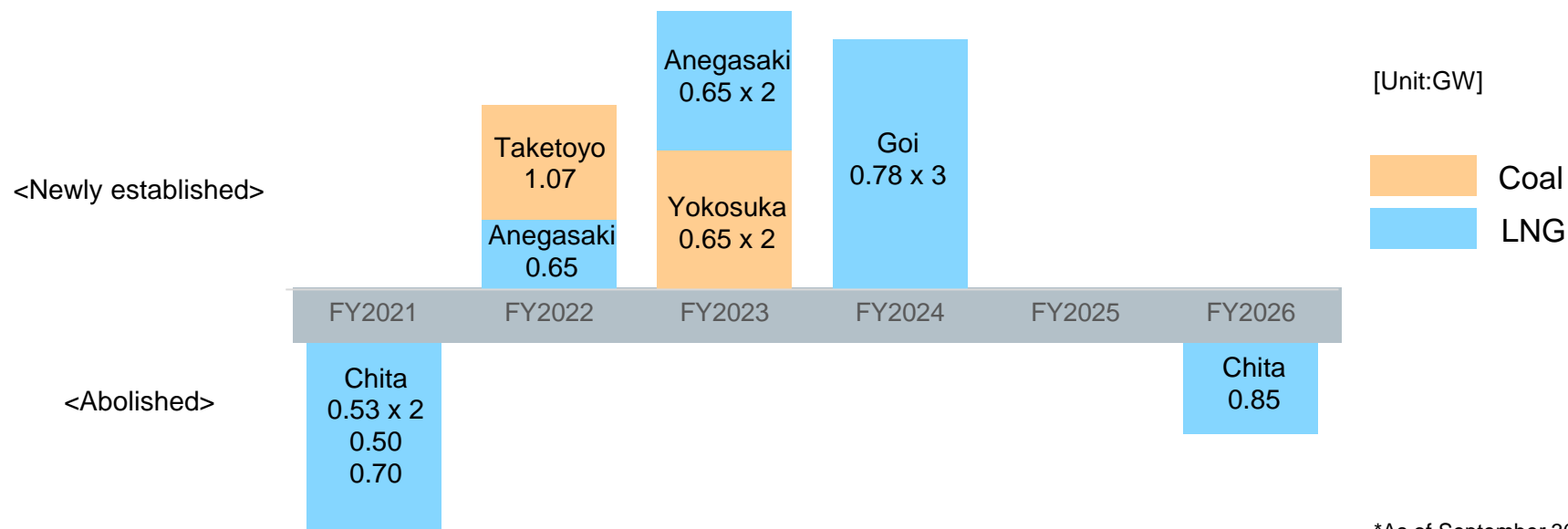
Country	Project Name	Investment ratio	Capacity	Fuel type	Notes
Thailand	Solar Power IPP	49.0%	31 MW	Solar	
Thailand	Wind Power IPP	5.0%	180 MW	Onshore Wind	
Bangladesh	Meghnaghat Gas Thermal IPP	49.0%	718 MW	Gas	Under construction
UAE	Umm Al Nar Gas Thermal IWPP	20.0%	1,550 MW	Gas	
Qatar	Ras Laffan B 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

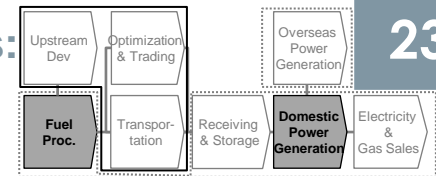
- Shifting to the latest high-efficiency thermal power generation facilities at three locations: Anegasaki, Yokosuka and Goi. Taketoyo Thermal Power Station Unit 5 has already started commercial operation on August 5, 2022.
- Unit 1 to 4 of Chita Thermal Power Station were abolished in FY2021, and Unit 5 is planned to be abolished in FY2026. Construction of Unit 7 and 8 is under consideration (environmental impact assessment has been done).



*As of September 30, 2022

Development point	Status of development
Anegasaki	Full-scale construction started in February 2020. Construction progress: 90%
Yokosuka	Full-scale construction started in August 2019. Construction progress: 87%
Goi	Full-scale construction started in April 2021. Construction progress: 56%

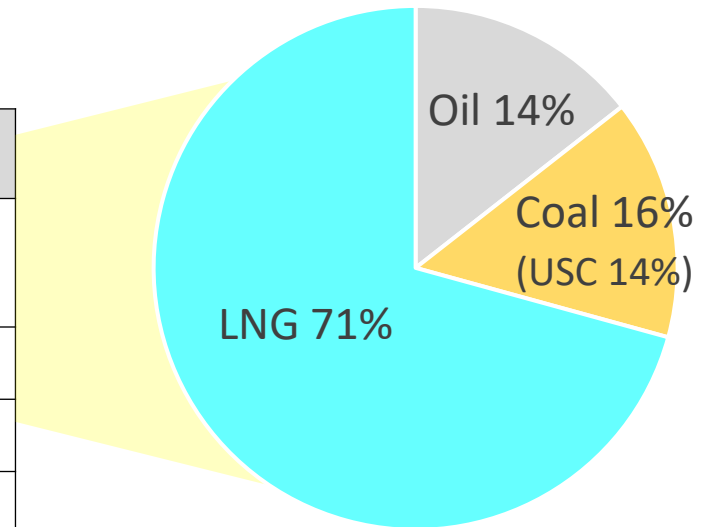
Domestic Thermal Power Generation and Gas Supply Business: Composition of Power Sources



- 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”

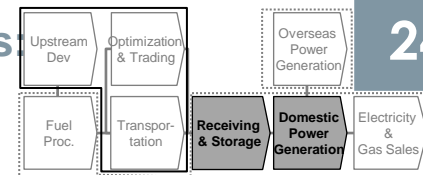
https://www.jera.co.jp/english/information/20201013_539

*² As of September 30, 2022. Includes capacity under construction.
Excludes capacity of affiliates.

*³ Includes LPG and City Gas.

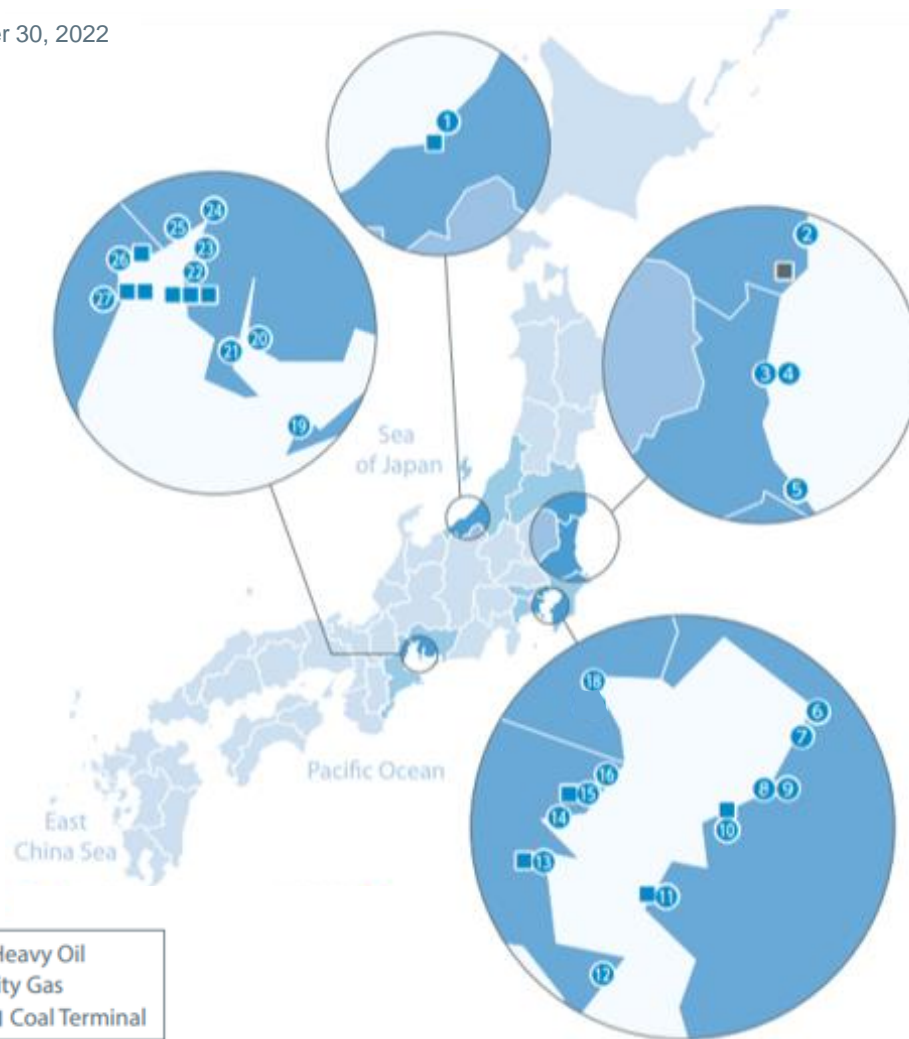
Domestic Thermal Power Generation and Gas Supply Business

Domestic Thermal Power Plants



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

As of September 30, 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	◆◆
⑲	Hekinan	4.10 GW	◆
㉑	Taketoyo <JERA Power TAKETOYO> *Started operation in August 2022	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	◆

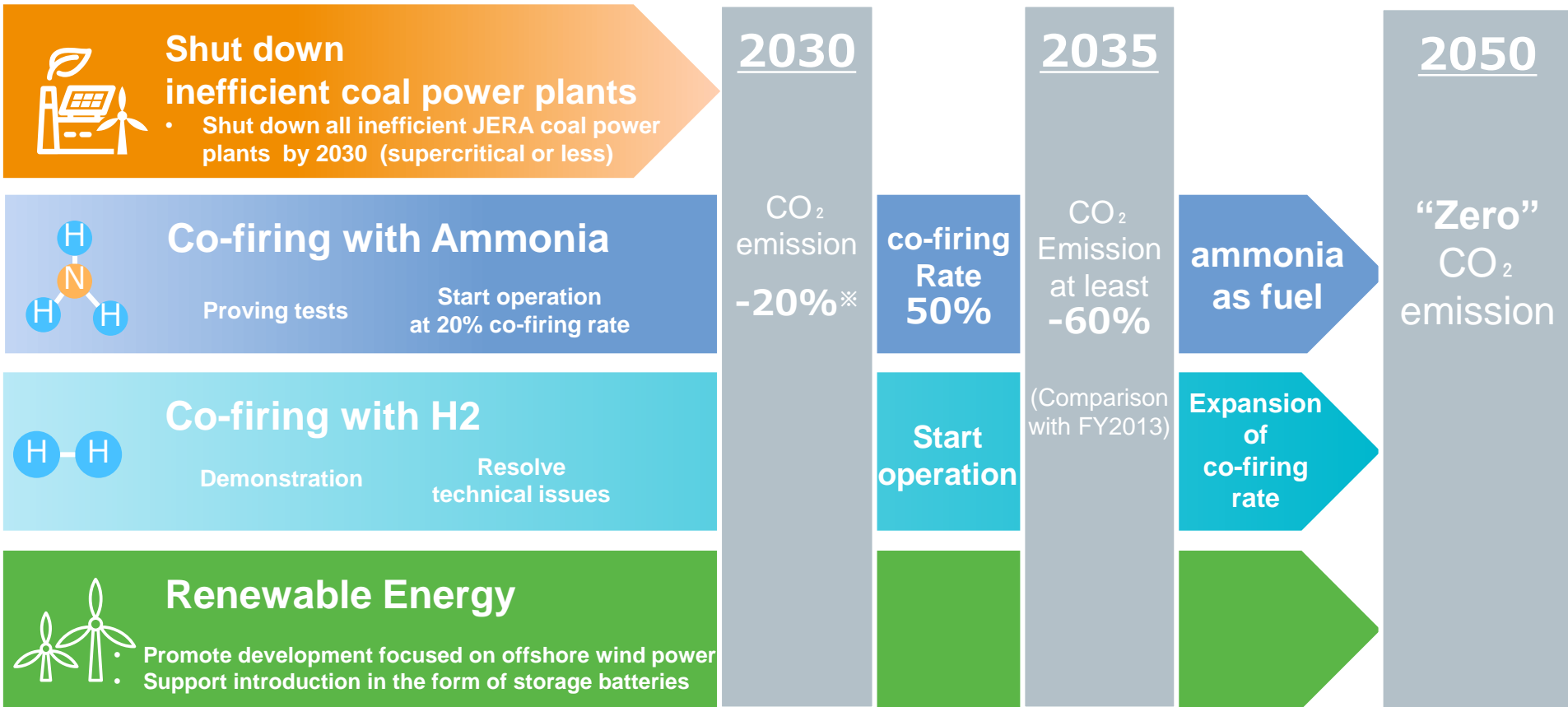
◆ LNG ◆ Coal ◆ Heavy Oil
 ◆ Crude Oil ◆ Utility Gas
 ■ LNG Terminal² ■ Coal Terminal

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: Roadmap for its Business in Japan

- JERA established “JERA Zero CO₂ Emissions 2050 Roadmap for its Business in Japan”, including four initiatives.



※Reduce carbon emission intensity of thermal power plants by 20% based on the long-term energy supply-demand outlook for FY2030 as set by the government

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

- Study of demonstration project for ammonia co-firing and co-firing rate improvement technology at Hekinan thermal power station
- Study of development and demonstration project for ammonia combustion burner suitable for coal boilers
- Study of hydrogen demonstration project at domestic LNG thermal power plant
- Study of hydrogen utilization at Unit 6 of the Linden gas-fired power station in the United States
- Development and demonstration of large-scale CO₂ separation and capture technology from exhaust of gas-fired power generation




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
- Demonstration of energy storage system data platform
- Development and demonstration of a low environmental impact recycling process for electric vehicle lithium-ion batteries
- Investment in Gla Lai, a leading renewable energy company in Vietnam

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. The timing of implementation of 20% co-firing of ammonia is going to be moved forward in FY2023 from FY2024.

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 FY2023. • 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-fire 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. The table below summarizes the details of the collaborations announced in the latest one year.

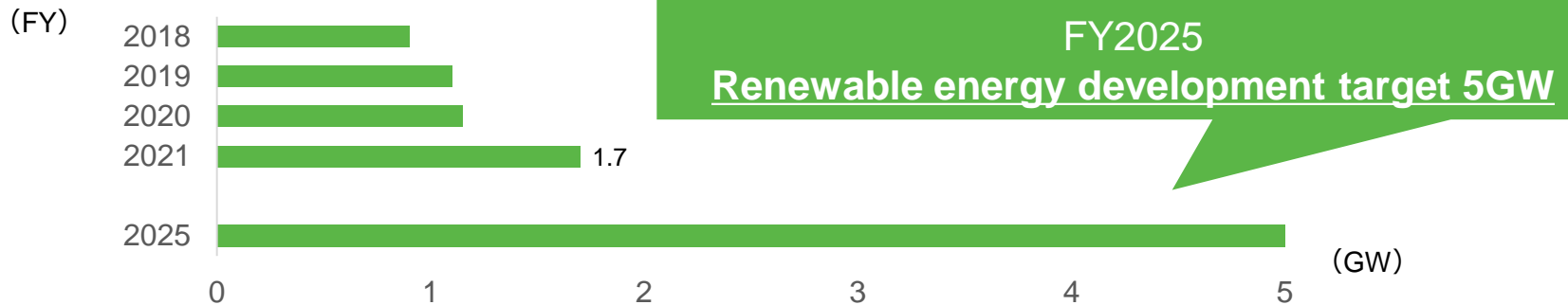
Business Partners *Including partially owned companies	Contents
Uniper Global Commodities S.E. (Germany) Uniper Global Commodities North America L.L.C. (United States)	Concluded MOU on procurement and sale of LNG, and clean ammonia from the United States (September 2022).
Idemitsu Kosan Co., Ltd. (Japan)	Concluded MOU stipulating that the two companies will jointly consider establishing a hydrogen supply chain based in the Ise Bay area (June 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).
Kyushu Electric Power Co., Inc. (Japan) Chugoku Electric Power Co., Inc. (Japan)	Concluded MOU to consider collaboration aimed at the adoption of hydrogen and ammonia as fuel for power generation (April 2022).

Topics : Collaboration with Uniper

- JERA and Uniper are considering jointly optimization of their respective LNG portfolios for supply to Japan and Germany and improvement of them for enhancement of the long-term stable supply.
- With regard to clean ammonia produced in the U.S., JERA is considering development of projects on the US Gulf Coast to produce hydrogen and convert it into clean ammonia to be supplied to JERA and Uniper, with the aim of increasing ammonia supply for use in Europe, and in the future, in Japan, and greater Asia.

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

Status and Targets of Renewable Energy Development



Topics : Investment in Gia Lai Electricity Joint Stock Company, a Leading Renewable Energy Power Company in Vietnam

- In August 2022, JERA has signed a share purchase agreement with the sellers to acquire approx. 35.1% of the outstanding shares of Gia Lai Electricity Joint Stock Company ("GEC").
- Vietnam has abundant renewable energy sources, and the Vietnamese Government is expected to set ambitious targets for renewable energy in the next national Power Development Plan.
- In order to support the country's growing electricity demand and decarbonization, GEC has a mission to expand its power generation assets to 1.7 GW by 2025, comprising mainly solar and wind power.
- JERA intends to contribute to both decarbonization and the country's growth, while striving to expand its revenue base.

【Company Overview】

Name	GIA LAI ELECTRICITY JOINT STOCK COMPANY
Overview	Vietnam's leading renewable energy developer and operator of hydro, solar, wind and other renewable energy projects; established in 1989; listed on the Ho Chi Minh Stock Exchange in 2019.
Major Shareholders	Thanh Thanh Cong Group (a local conglomerate active for over 40 years in agriculture, energy, real estate, and tourism)
Power generation assets (as of the end of 2021)	Hydro : 81MW (12 Plants) Solar : 292MWp (5 Plants + 34 Rooftop systems) Wind : 130MW (3 Plants)
Market capitalization	Approx. 180 million USD *As of October 24, 2022

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, Seagull 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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