



エネルギーを新しい時代へ

FY2021 Third Quarter Consolidated Financial Results

(Note) The company's fiscal year (FY) is from April 1 to March 31 of the following year in this material.
"3Q" refers to the period from April 1 to December 31.

JERA Co., Inc.

January 28, 2022

Outline of Financial Results

1

Consolidated Statement of Income

(Unit: Billion Yen)

	2021/3Q(A)	2020/3Q(B)	Change(A-B)	Rate of Change(%)
Operating revenue (Net sales)	2,853.7	1,953.1	900.5	46.1
Operating income	79.3	272.0	(192.7)	(70.8)
Ordinary income	55.7	284.6	(228.9)	(80.4)
Quarterly net income attributable to owners of parent	18.4	196.5	(178.1)	(90.6)
<Reference>Income excluding time lag	228.3	64.1	164.1	256.0

Consolidated Balance Sheet

(Unit: Billion Yen)

	As of Dec 31, 2021(A)	As of Mar 31, 2021(B)	Change(A-B)	Rate of Change(%)
Assets	6,390.0	4,090.8	2,299.1	56.2
Liabilities	4,520.4	2,328.7	2,191.7	94.1
Net assets	1,869.5	1,762.1	107.4	6.1
Outstanding interest-bearing debt	2,521.3	1,613.2	908.0	56.3
Equity ratio (%)	27.5	41.2	(13.7)	

Key Points of Financial Results

【Operating Revenue】

- Sales **increased by 900.5 billion yen (up 46.1%) to 2,853.7 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 **fell by 178.1 billion yen (down 90.6%) to 18.4 billion yen.**
Net income decreased due to the shift from gains to losses of time lag (- 342.2 billion yen [132.4 billion yen to - 209.8 billion yen]) despite a substantial increase in net income excluding the effect of time lag (+ 164.1 billion yen).
- Net income excluding the effect of time lag **increased by 164.1 billion yen to 228.3 billion yen.**
Despite an impairment loss in the overseas power generation business (-32.6 billion yen) and an impairment loss on non-current assets (-16.2 billion yen) , net income substantially increased due to the rebound from the COVID-19 negative impact in the same period of the previous year (+ 28.8 billion yen), an increase in profit of JERAGM (+ 61.2 billion yen) and gain on sale of LNG (+36.0 billion yen).

*Equity ratio

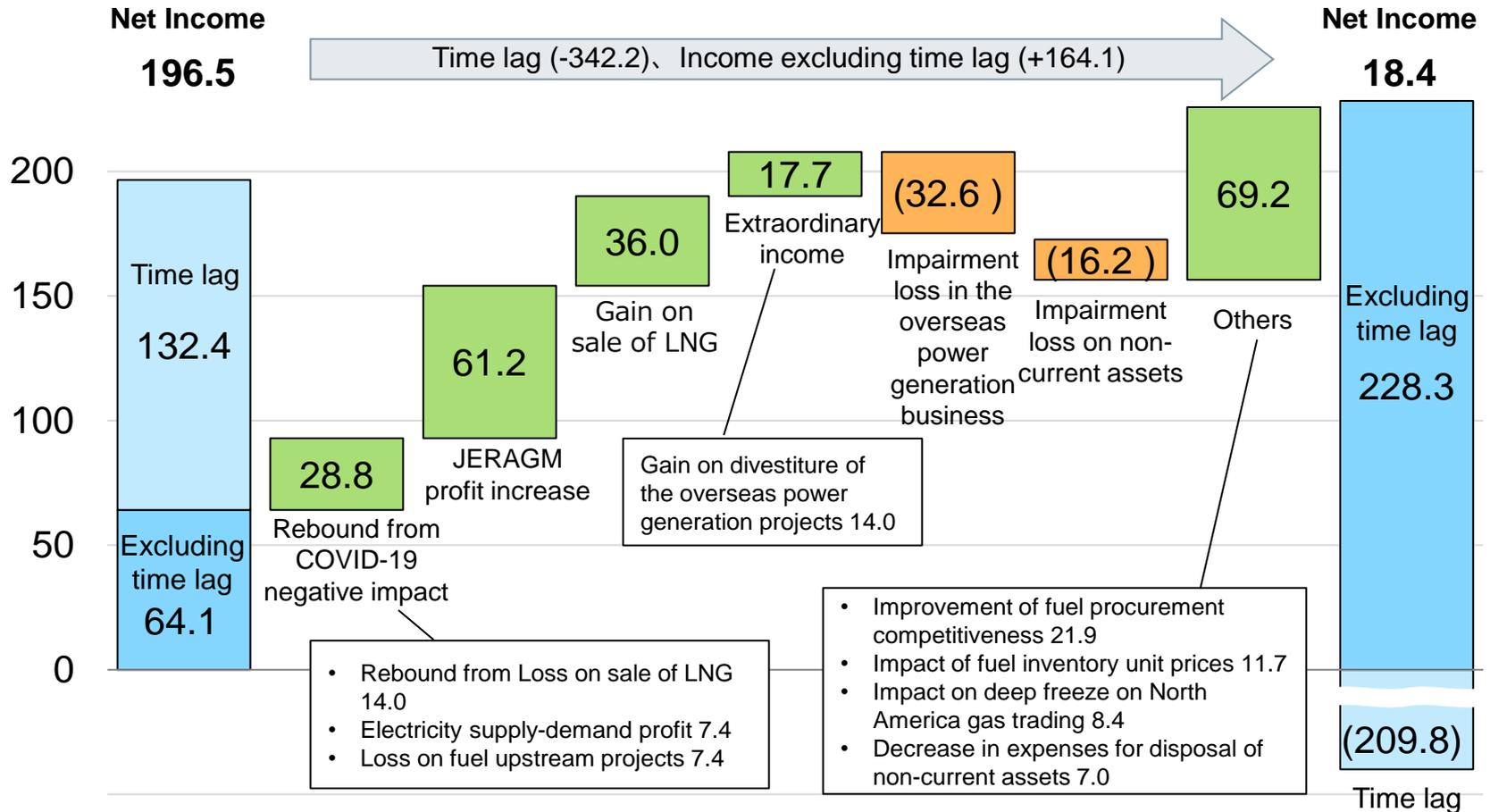
- JERAGM engaged in fuel trading makes contracts for both procurement and sales as physical and financial transactions* and the fair value of the outstanding all contracts are reported as assets “derivative securities” and liabilities “derivative obligations” in the statement of financial position. While significant changes in fair value due to a spike of fuel index prices have led to huge increases in both derivative asset and liabilities in JERAGM, the risk capacity has not declined substantially.

*Singapore Financial Reporting Standard

Consolidated Net Income

【Various factors of Consolidated net income】

(Unit : Billion Yen)



Note: Figures are after-tax amounts.

2021/3Q

Consolidated Income/Expenditure Comparison

(Unit: Billion Yen)

	2021/3Q(A)	2020/3Q(B)	Change(A-B)	Main Factors of Changes
Operating revenue (Net sales)	2,853.7	1,953.1	900.5	<ul style="list-style-type: none"> • Increase of electrical energy sold • Increase in sales of JERAGM
Operating expenses	2,774.3	1,681.0	1,093.2	<ul style="list-style-type: none"> • Increase of fuel costs • Increase in costs of JERAGM
Operating income	79.3	272.0	(192.7)	
Non-operating income	7.9	20.3	(12.3)	
Non-operating expenses	31.6	7.8	23.8	<ul style="list-style-type: none"> • Share of loss of entities accounted for using equity method 21.8
Ordinary income	55.7	284.6	(228.9)	<ul style="list-style-type: none"> • Decrease of time lag income -475.3(183.9 → -291.4) • Increase of income excluding time lag +246.4(100.7 → 347.1)
Extraordinary income	23.5	-	23.5	<ul style="list-style-type: none"> • Gain on divestiture of the overseas power generation projects 19.5
Extraordinary loss	22.8	5.7	17.1	<ul style="list-style-type: none"> • Impairment loss of domestic thermal power generation equipment 22.8
Income taxes, etc.	(8.7)	72.5	(81.2)	
Quarterly net income attributable to non-controlling Interests	46.7	9.8	36.8	
Quarterly net income attributable to owners of parent	18.4	196.5	(178.1)	

Key Elements of Income and Expenditure

	2021/3Q(A)	2020/3Q(B)	Change(A-B)
Electrical Energy Sold(TWh)	183.2	176.4	6.8
Crude Oil Prices(JCC) (dollar/barrel)	74.0	39.1	34.9
Foreign Exchange Rate (yen/dollar)	111.1	106.1	5.0

Note: Crude Oil Prices(JCC) for 2021/3Q is tentative.

Consolidated Balance Sheet

(Unit: Billion Yen)

	As of Dec 31, 2021(A)	As of Mar 31, 2021(B)	Change(A-B)	Main Factors of Changes
Cash and deposits	608.4	616.1	(7.6)	
Property, plant and equipment	2,106.5	2,010.0	96.5	• Progress in replacing domestic thermal power plants
Investment securities	739.5	559.4	180.1	• Investment in new project
Others	2,935.4	905.3	2,030.1	• Increase in derivative securities (JERAGM, etc.) +1,150.5
Assets	6,390.0	4,090.8	2,299.1	
Outstanding interest-bearing debt	2,521.3	1,613.2	908.0	• Borrowings +543.0 (Subsidiaries +355.3) • Commercial Paper + 295.0 • Corporate Bonds +70.0
Others	1,999.1	715.4	1,283.6	• Increase in derivative obligations (JERAGM, etc.) +1,004.2
Liabilities	4,520.4	2,328.7	2,191.7	
Shareholders' equity	1,681.9	1,696.9	(14.9)	• Dividends paid -33.4 • Quarterly net income +18.4
Others	187.5	65.1	122.4	• Foreign currency translation adjustments +54.1
Net Assets	1,869.5	1,762.1	107.4	
Equity ratio (%)	27.5	41.2	(13.8)	• Decrease in the ratio mainly due to an increase in both derivative securities and obligations

Segment Information

(Unit: Billion Yen)

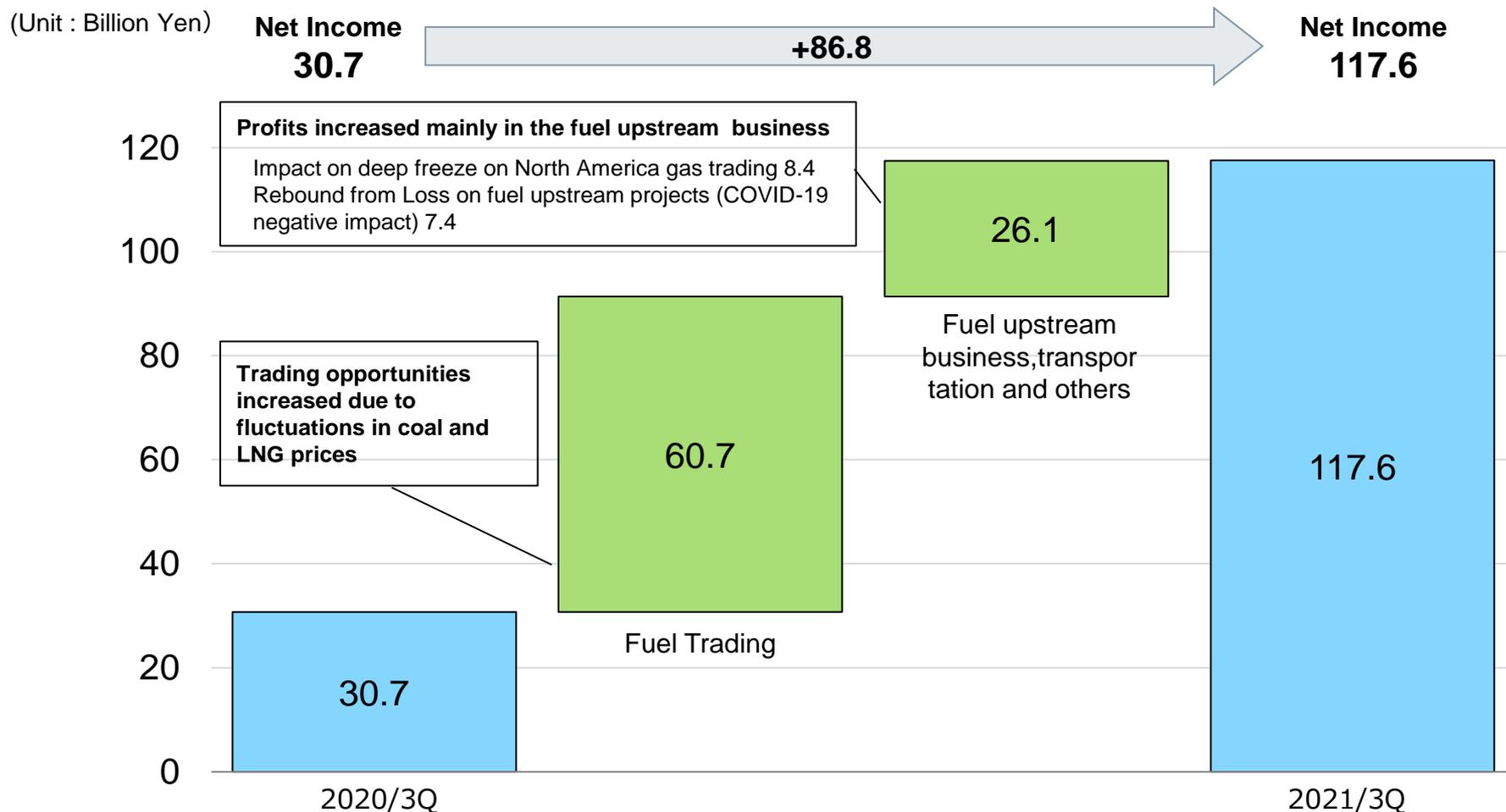
	2021/3Q(A)		2020/3Q(B)		Change(A-B)		Main Factors of Changes in Net Income
	Operating Revenue	Net Income	Operating Revenue	Net Income	Operating Revenue	Net Income	
Fuel related*1	1,980.2	117.6	613.7	30.7	1,366.5	86.8	<ul style="list-style-type: none"> JERAGM Profit Increased +61.2 Impact on deep freeze on North America gas trading +8.4 Rebound from COVID-19 negative impact +7.4
Overseas power generation	2.4	(10.9)	1.6	5.1	0.8	(16.1)	<ul style="list-style-type: none"> Impairment loss in Formosa 2 - 32.3 Gain on divestiture of projects 14.0
Domestic thermal power generation and gas supply	2,031.8	(59.9) 144.9*2	1,775.8	190.1 57.7*2	255.9	(250.1) 92.1*2	<ul style="list-style-type: none"> Rebound from COVID-19 negative impact +21.4 Gain on sale of LNG +36.0 Impairment loss on non-current assets -16.2 Improvement of fuel procurement competitiveness +21.9 Impact of fuel inventory unit prices +11.7 Decrease in expenses for disposal of non-current assets +7.0
Adjustments	(1,160.7)	(28.2)	(438.0)	(29.5)	(722.7)	1.2	
Consolidated	2,853.7	18.4 228.3*2	1,953.1	196.5 64.1*2	900.5	(178.1) 164.1*2	

*1 Fuel upstream, transportation and trading

*2 Excluding the effect of time lag

Results of Fuel related business

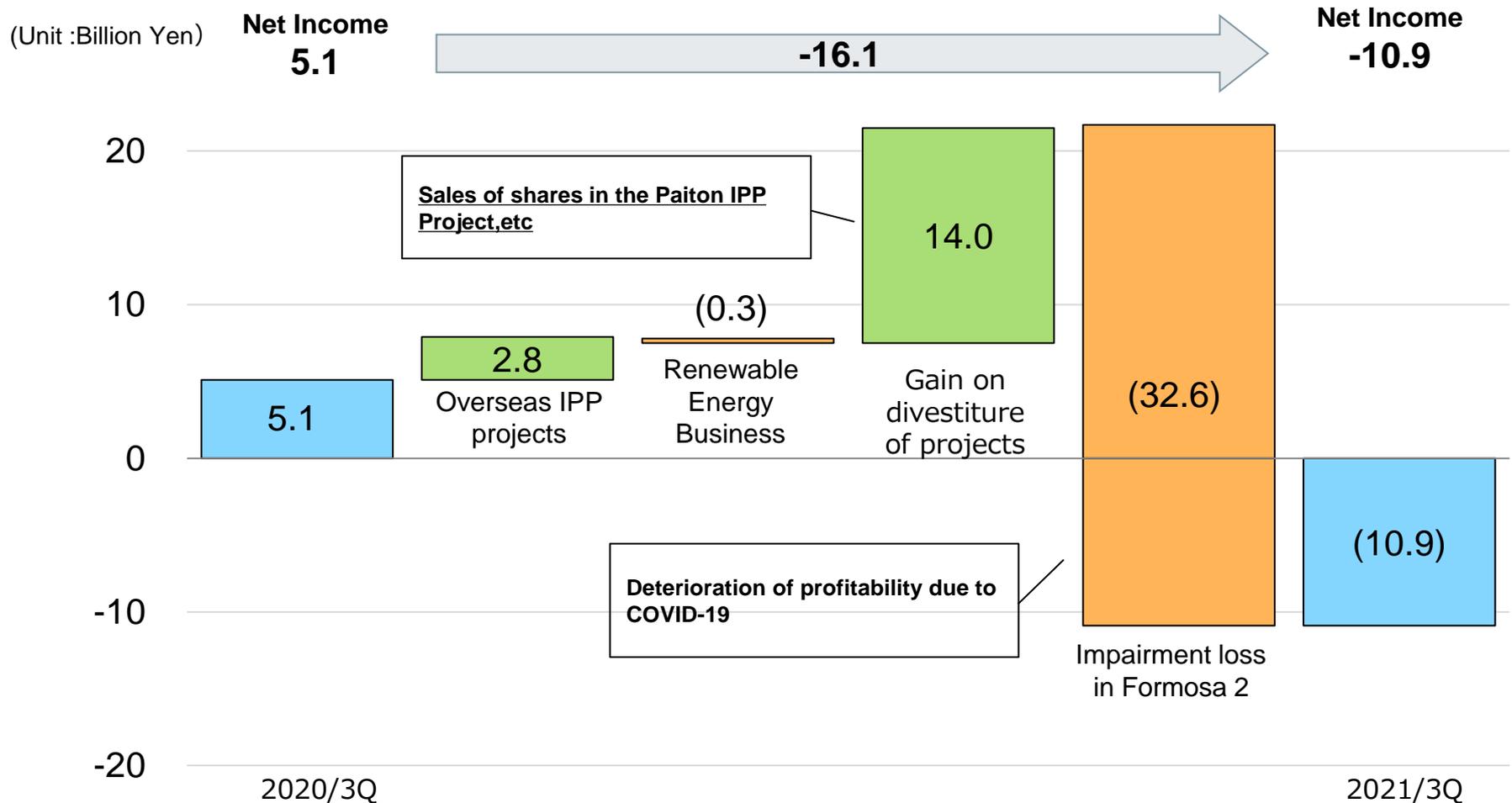
■ Significant increase in fuel trading and upstream business



Note: Figures are after-tax amounts.

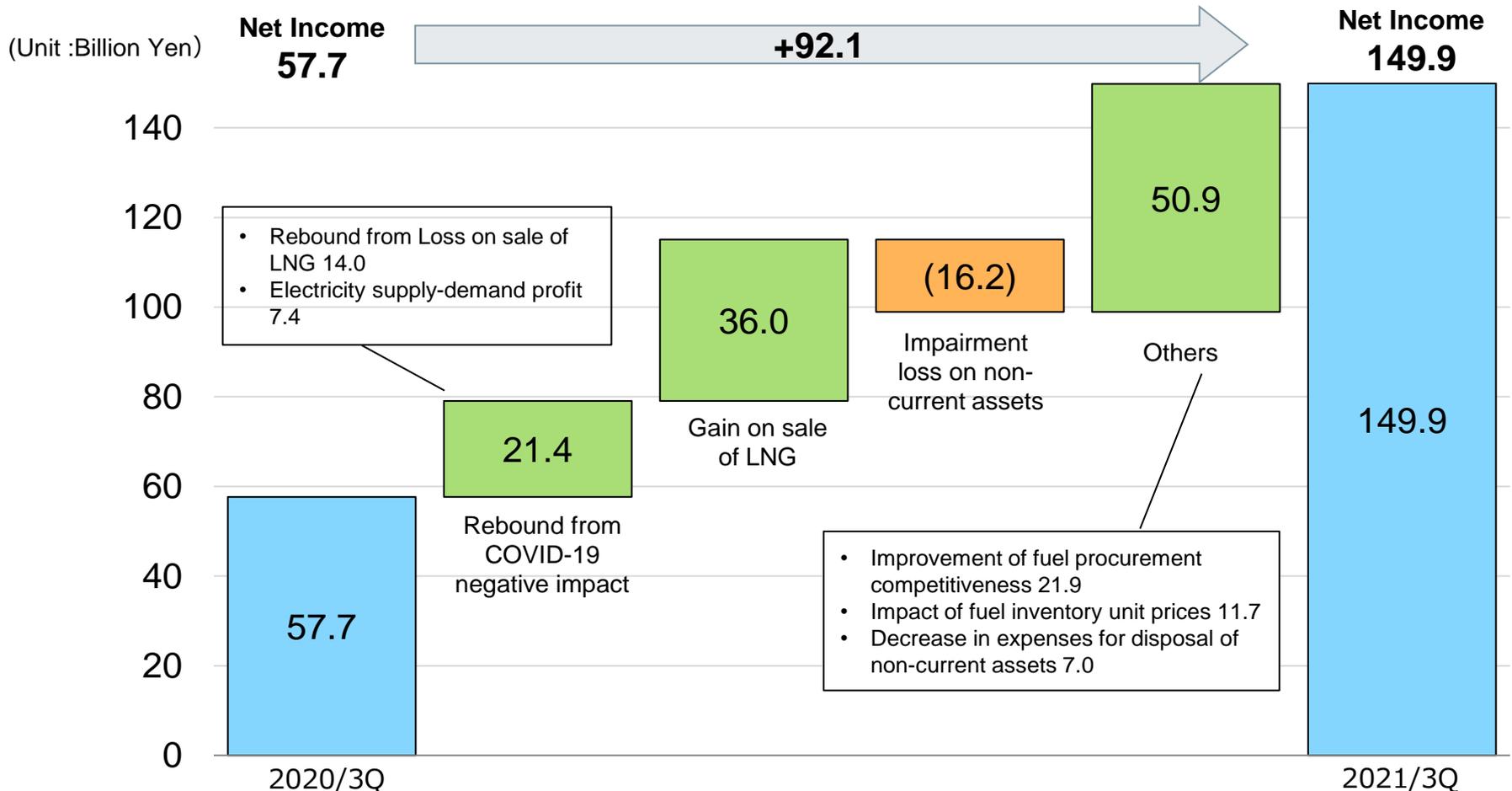
Results of Overseas power generation business

- Profit decreased due to impairment loss in Formosa 2 despite Gain on divestiture of Paiton IPP project, etc



Results of Domestic thermal power generation and gas supply business

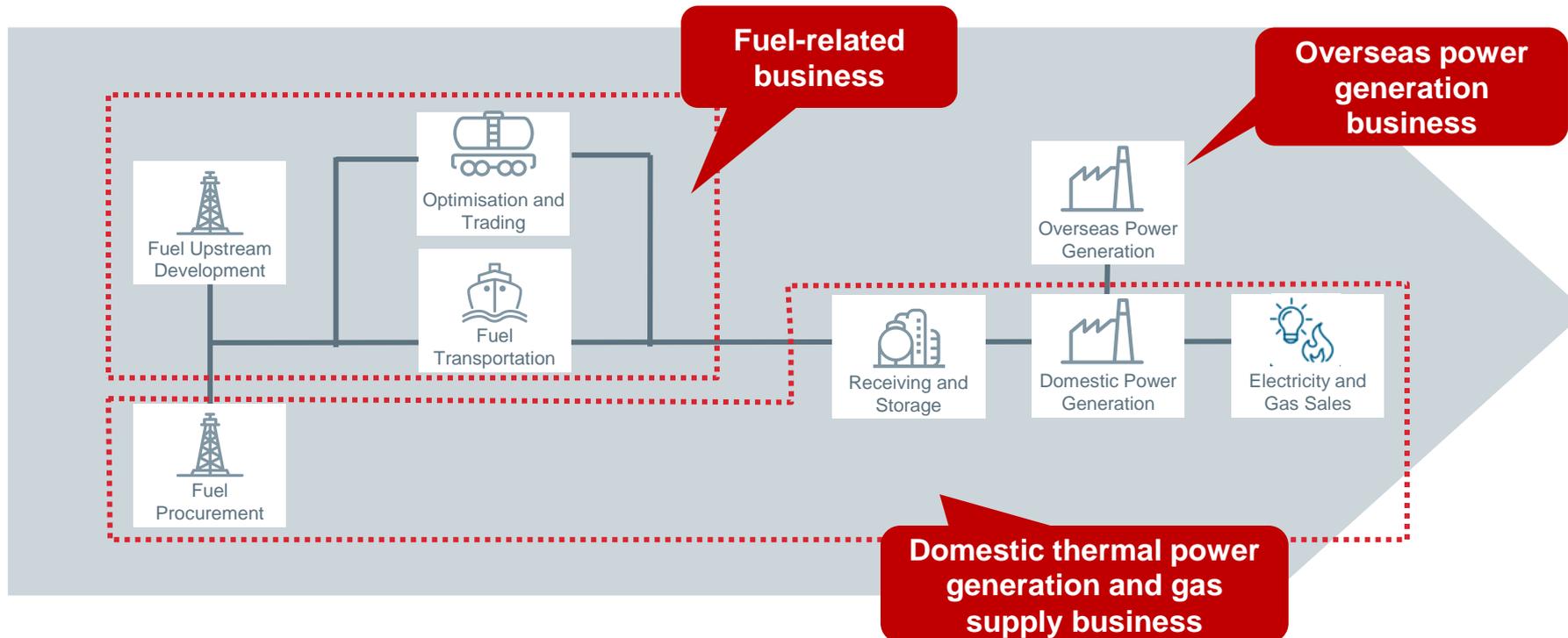
- A sharp increase in profit excluding time lag due to factors such as rebound from COVID-19 negative impact, gain on sale of LNG



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

Reference: JERA's Value Chain and Segment Division

- 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.
- JERA has three business segment; "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 FY2021

- The net income forecast is 0.0 billion yen, unchanged from the previous announcement (2021/2Q).
- Net income excluding the effect of time lag is estimated to be 200 billion yen, 50 billion yen increase from the previous forecast(2021/2Q), mainly due to an increase in profit of JERAGM (Approximately +20 billion yen) and gain on sale of LNG,etc (Approximately +30 billion yen).

(Unit: Billion Yen)

	Current Forecast(A)	Previous Forecast(B)	Change(A-B)	Rate of Change(%)
Net Income attributable to owners of parent	0.0	0.0	(Approx. 0.0)	-
Breakdown: Time lag	(200.0)	(150.0)	(Approx. 50.0)	-
Income excluding time lag	200.0	150.0	Approx.50.0	33.3

【Reference : Comparison with the previous year's result】

(Unit: Billion Yen)

	Current Forecast(A)	FY2020 Result(B)	Change(A-B)	Rate of Change(%)
Net Income attributable to owners of parent	0.0	157.8	(Approx. 158.0)	-
Breakdown: Time lag	(200.0)	46.2	(Approx. 246.0)	-
Income excluding time lag	200.0	111.6	Approx. 88.0	78.9

【Key data】

	Current Forecast	Fourth quarter of FY2021	Previous Forecast	【Reference】 FY2020 Result
Crude Oil Prices(JCC) (dollar/barrel)	Approx. 75	Approx. 80	Approx. 73	43.4
Foreign Exchange Rate (yen/dollar)	Approx. 112	Approx. 115	Approx. 110	106.1

Appendix

(Reference) Sensitivity to net income of crude oil price and exchange rate

【Domestic thermal power generation and gas supply business】

(Unit: Billion Yen)

Crude oil Prices (Increase in 1 \$/b)		Impact on Net Income
		Jan - Mar
Timing of Change	After Jan,2022	0.0

If crude oil prices fluctuate after January, the impact on the net income for January-March will be minimal.

(Unit: Billion Yen)

Foreign Exchange Rate (1Yen depreciation against dollar)		Impact on Net Income
		Jan - Mar
Timing of Change	After Jan,2022	-3.0

If the yen weakens against the U.S. dollar by 1 yen after January, the net income for January-March will deteriorate by approximately 3.0 billion yen.

【Fuel-related, Overseas power generation business】

(Unit: Billion Yen)

Crude oil Prices (Increase in 1 \$/b)		Impact on Net Income
		Jan - Mar
Timing of Change	After Jan,2022	+0.1

If crude oil prices rise by 1\$/b after January onwards, the net income for January-March will improve by approximately 0.1 billion yen

(Unit: Billion Yen)

Foreign Exchange Rate (1Yen depreciation against dollar)		Impact on Net Income
		Jan - Mar
Timing of Change	After Jan,2022	+0.1

If the yen weakens against the U.S. dollar by 1 yen/\$ after January, the net income for January-March will improve by approximately 0.1 billion yen.

(Reference) Trends in crude oil price and exchange rates

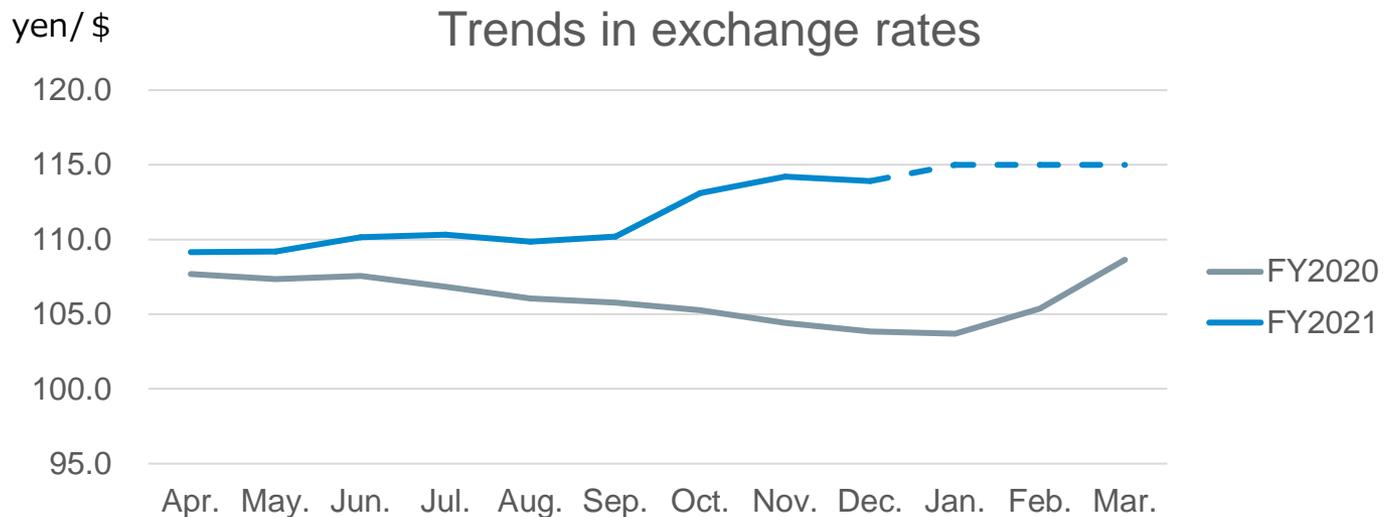
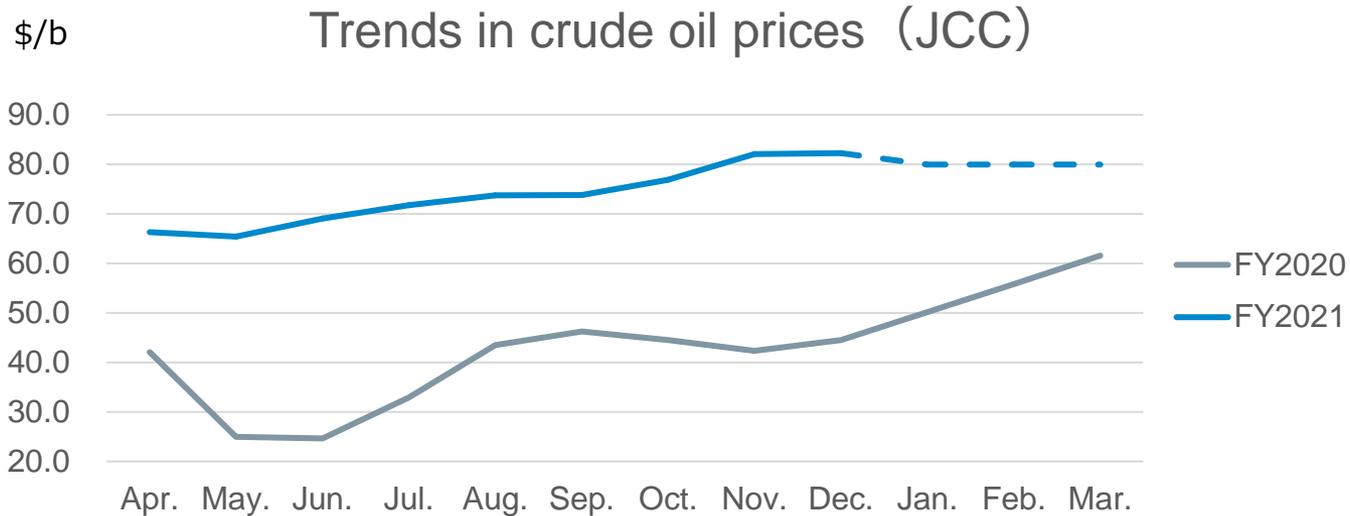
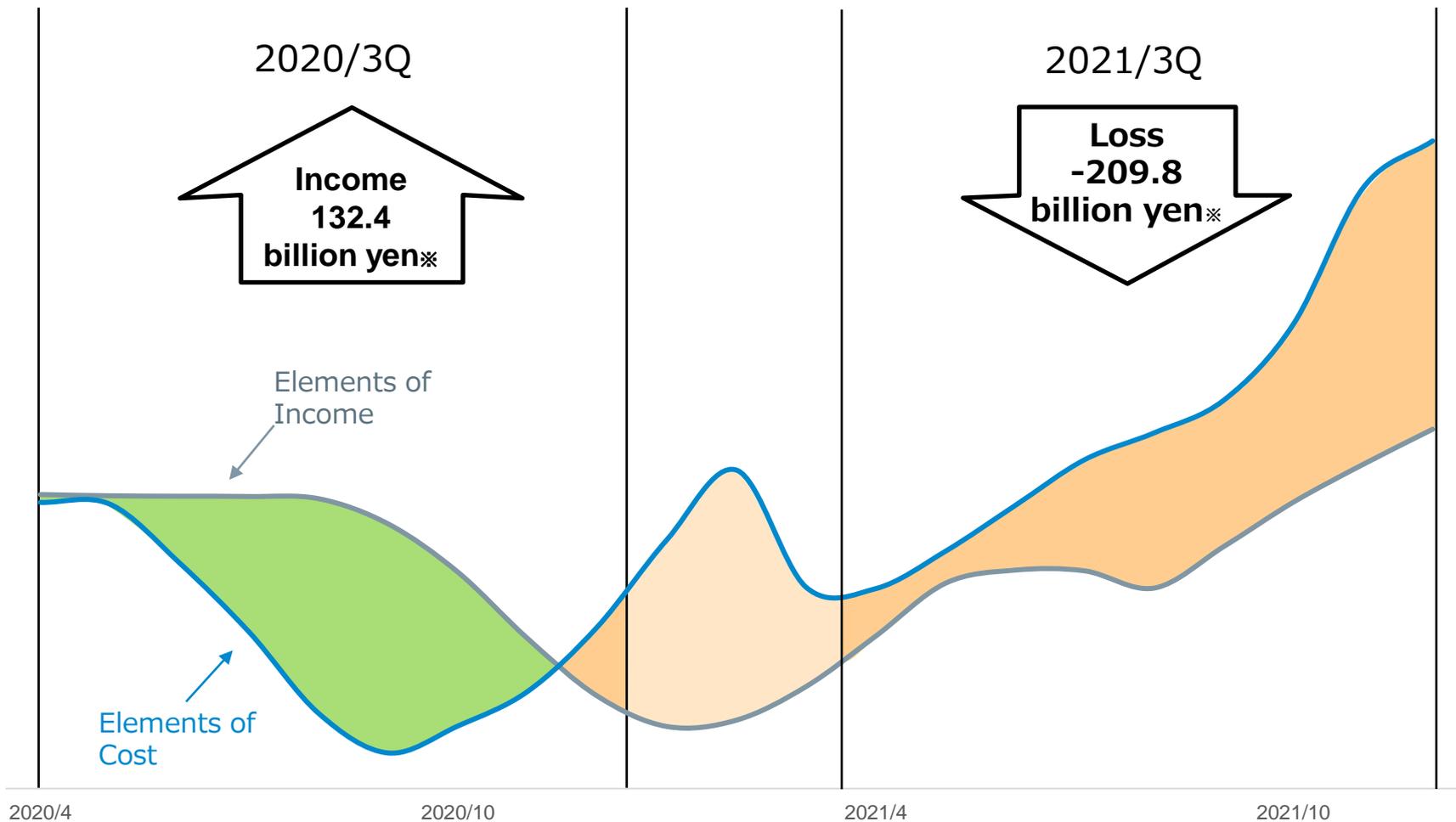
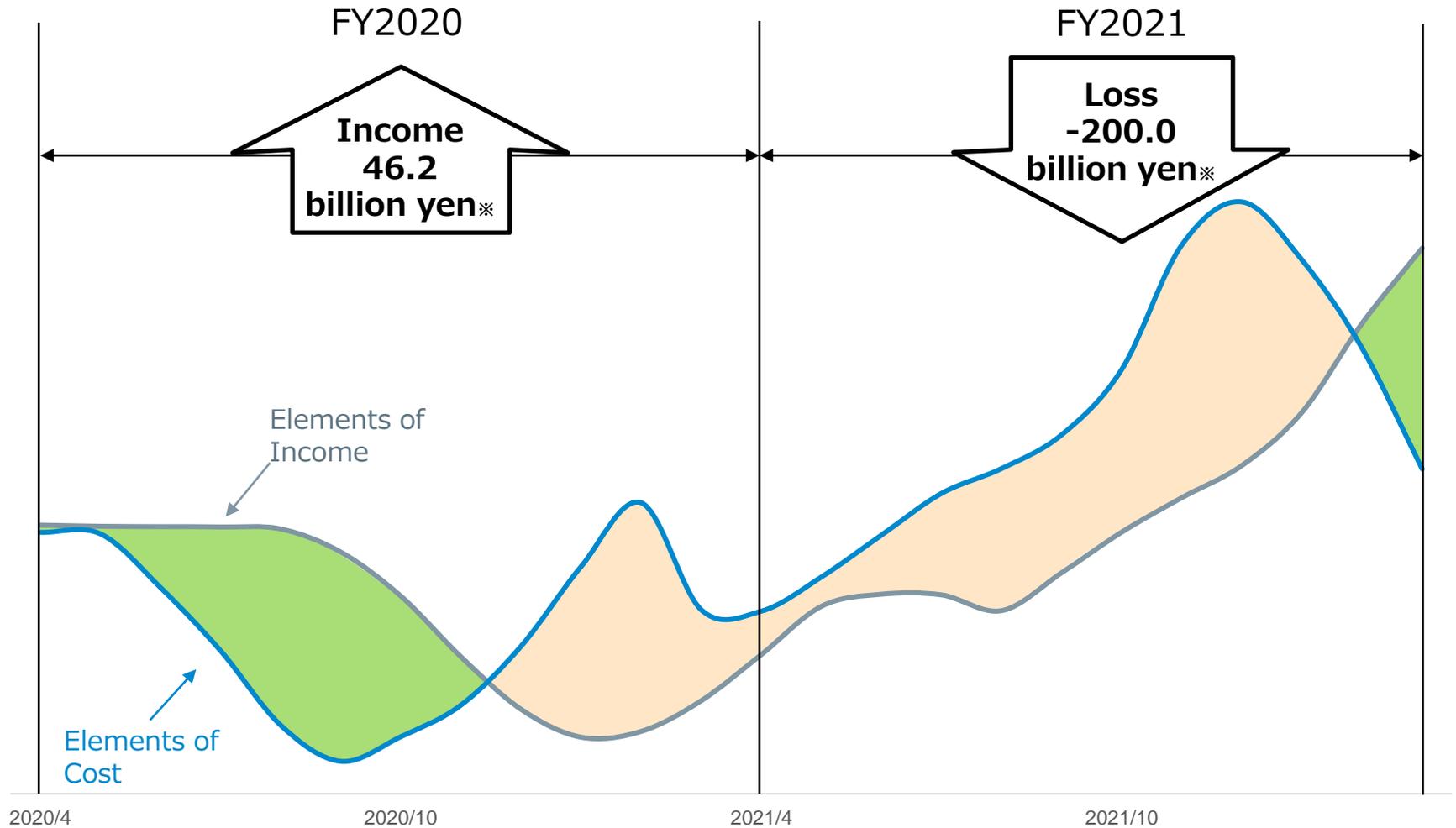


Image of Time Lag (2020/3Q – 2021/3Q)



* Figures are after-tax amounts.

Image of Time Lag (FY2020 – FY2021)



* 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	3Q (Apr 1 to Dec 31)
FY2021	53.7	64.6	64.9	183.2
FY2020	47.5	62.4	66.5	176.4

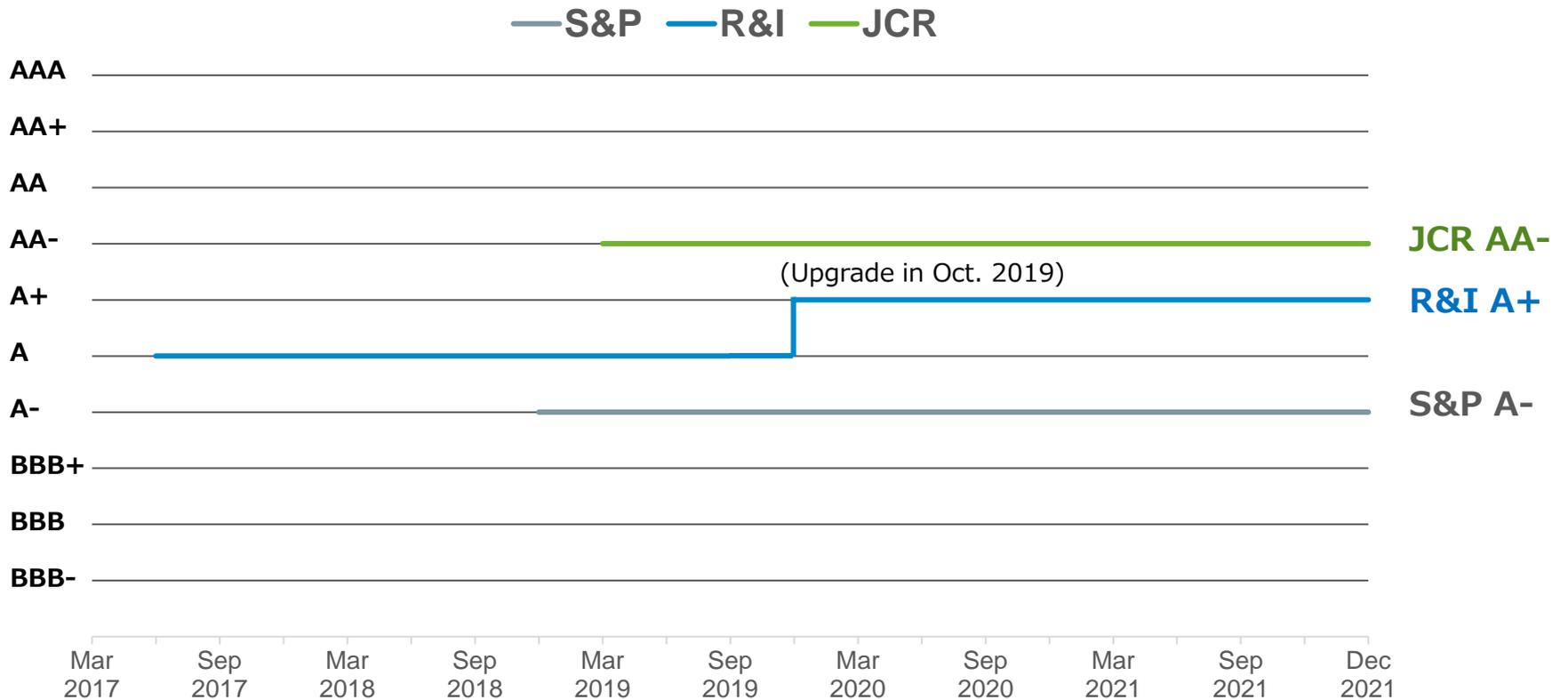
【Electrical Power Generated(TWh)】

	Apr 1 to Jun 30	Jul 1 to Sep 30	Oct 1 to Dec 31	3Q (Apr 1 to Dec 31)
FY2021	53.4	61.7	62.3	177.4
LNG	41.2 (77%)	46.8 (76%)	48.4 (78%)	136.4 (77%)
Coal	12.2 (23%)	14.9 (24%)	13.8 (22%)	40.9 (23%)
Other	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
FY2020	47.0	61.7	66.0	174.7
LNG	38.4 (82%)	52.9 (86%)	54.5 (83%)	145.7 (83%)
Coal	8.7 (18%)	8.8 (14%)	11.5 (17%)	28.9 (17%)
Other	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)

*The total may not match due to rounding

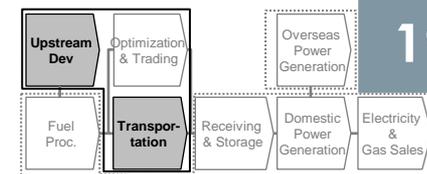
Credit Ratings

【 Issuer Credit ratings history 】



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

Fuel-related Business: Overview of Fuel-related Business



[Fuel Upstream / Fuel Transportation Business]

- We are leveraging the world's largest LNG transaction volume (FY2020: Approximately 40 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.

Upstream Project

*JERA Group as a whole

Project Name	Address	LNG production / liquefaction capability	Our company Investment ratio *
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%

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

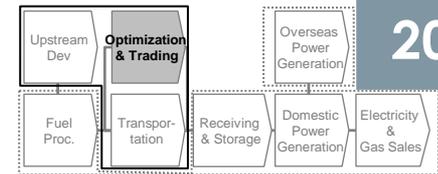
Topics

- In 2021, we decided to invest in the following projects.
- Both projects are 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.

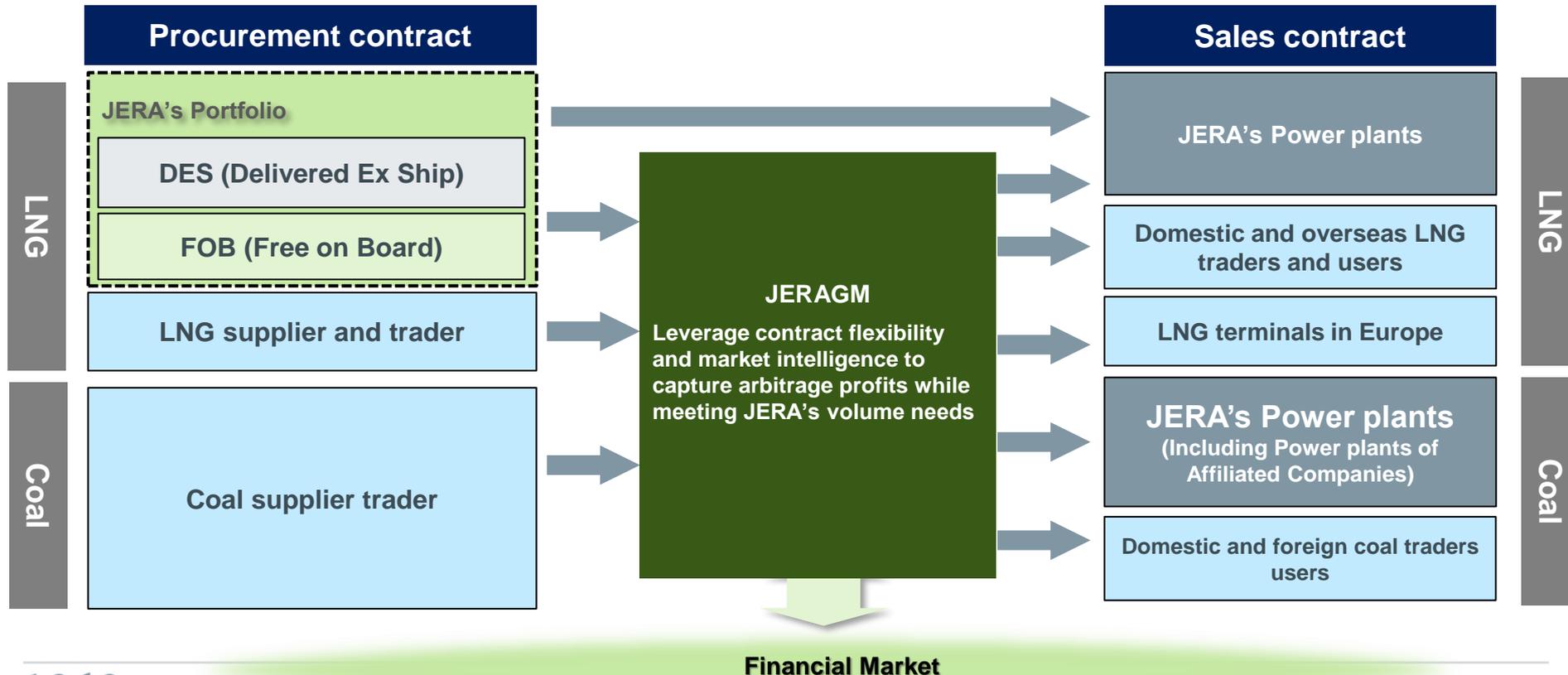
Project Name	Address	LNG production / liquefaction capability	Our company Investment ratio
Barossa/Caldita gas field Project	Australia	LNG production and liquefaction capacity is the same scale as Darwin LNG Project.	12.5%
Acquisition of partial interests in Freeport LNG Project*	United States	Approx. 15.45 million t/year for all three lines	25.7%

*Freeport LNG Project Management Company

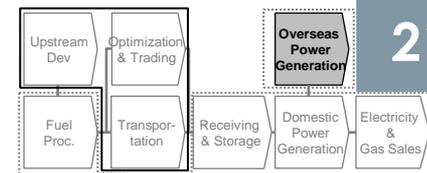
Fuel-related Business: Trading Business



- JERAGM has offices in Singapore, the United Kingdom, the Netherlands, the United States, and Japan, and approximately 300 employees participate 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.
- JERAGM trades within the limited volume under the governance of the Board of Directors elected by shareholders

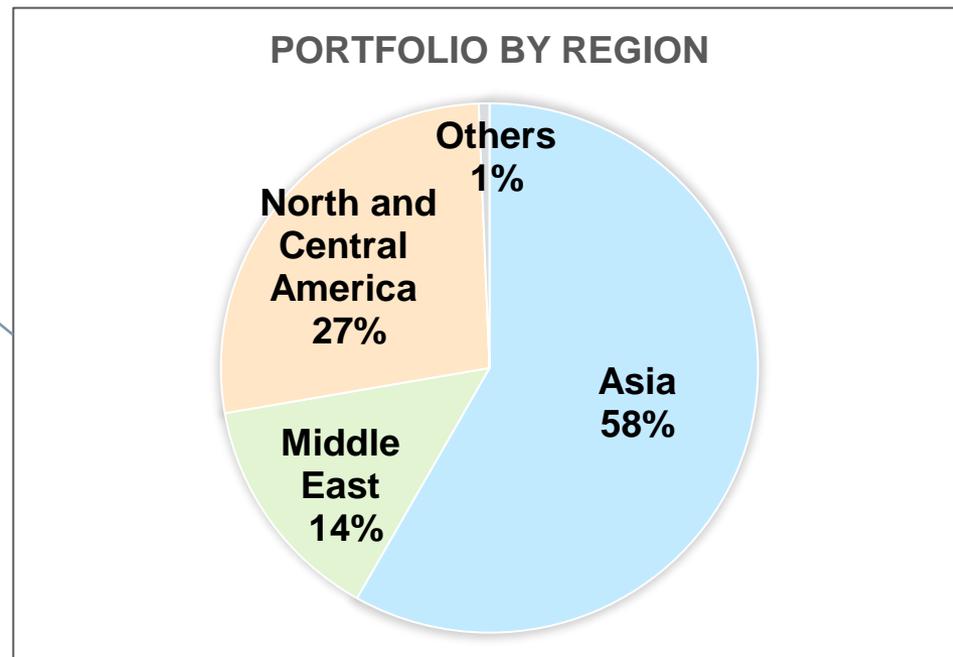
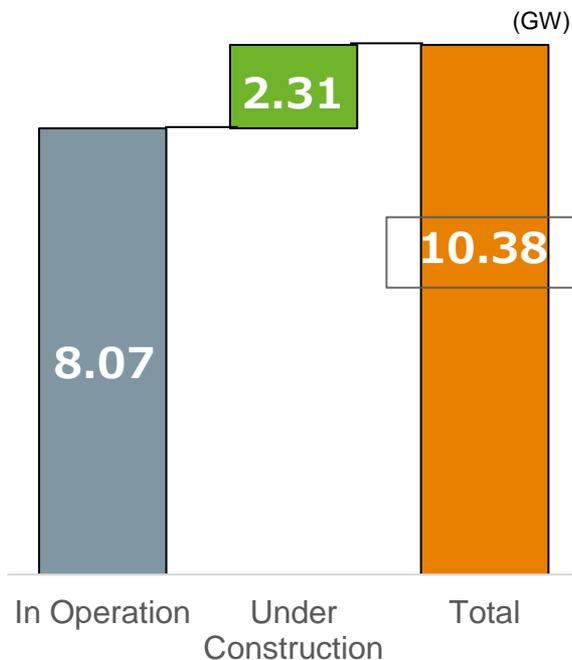


Overseas Power Generation Business: Portfolio of Overseas Power Generation Business



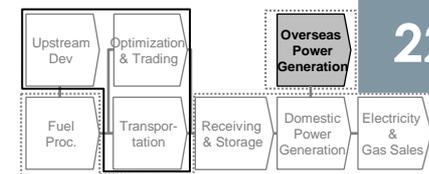
- JERA is expanding its businesses across the world through the experience gained from existing projects around the world. Total capacity of power generation in overseas projects is 10.38 GW (including under construction).
- Participation in Aboitiz Power Corporation, a major power company in the Philippines in December 2021. Increase JERA's presence in the energy sector in the country and accelerate decarbonization there.
- JERA sold the shares in Indonesia's PT Paiton Energy in August 2021 and Cogeneration Projects at Industrial Estates in Thailand in December 2021. The company also plans to sell shares in Falcon Gas Thermal Power Co. in Mexico by the end of FY2021. 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.

< Power generation capacity (As of December 31, 2021)>



Overseas Power Generation Business:

List of overseas power generation projects (1)



22

(As of Dec 31, 2021)

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

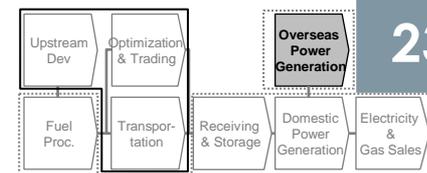
Country	Project Name	Investment ratio	Capacity	Fuel type	Notes
Philippines	TeaM Energy IPP	10.0%~50.0%	3,592 MW	Coal/Gas	
Philippines	Aboitiz Power Corporation	27%	4,638 MW	Coal/Oil/Renewable	Including under construction
Thailand	EGCO Corporation	12.3%	5,959MW	Coal/Gas/Renewable	Including under construction
India	ReNew Company	6.7%	10,332MW	Solar Power/Wind Power/Hydro power	Including under construction
Bangladesh	Summit Power IPP	22.0%	2,419 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:

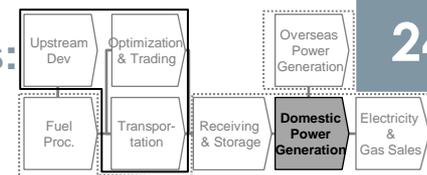
List of overseas power generation projects (2)



(As of Dec 31, 2021)

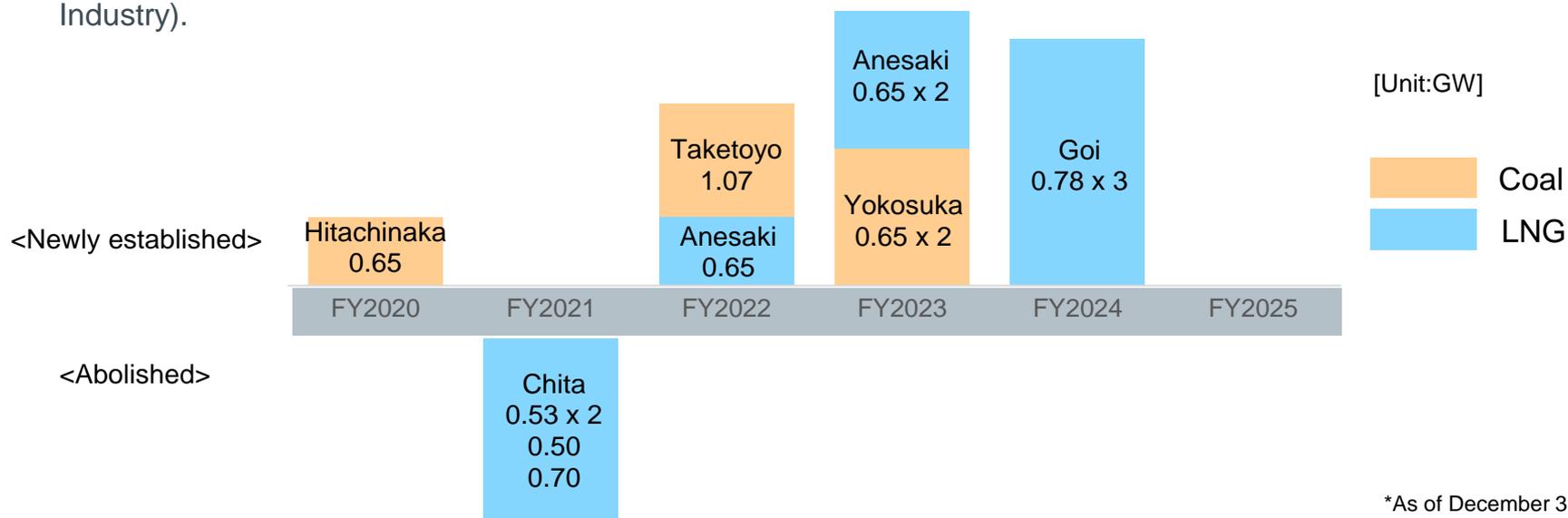
IPP Projects (2/2)					
Country	Project Name	Investment ratio	Capacity	Fuel type	Notes
Thailand	Solar Power IPP	49.0%	31 MW	Solar Power	
Thailand	Wind Power IPP	5.0%	180 MW	Wind Power	
Bangladesh	Meghnaghat Gas Thermal IPP	49.0%	718 MW	Gas	Under construction
UAE	Umm Al Nar Gas Thermal IWPP	20.0%	2,200 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 in FY2021
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 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

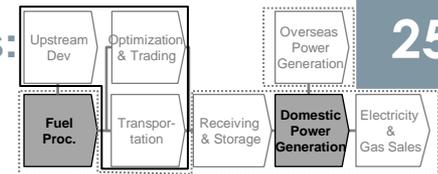
- Shifting to the latest high-efficiency thermal power generation facilities at five locations: Hitachinaka, Anesaki, Taketoyo, Yokosuka, and Goi. Unit 1 of the Hitachinaka Kyodo started operation in January 2021.
- Planning to abolish Unit 1 to 5 of Chita Thermal Power Station. Construction of Unit 7 and 8 is under consideration (Submitted environmental impact assessment statement to the Minister of Economy, Trade and Industry).



*As of December 31, 2021

Development point	Status of development
Anesaki	Full-scale construction started in February 2020. Construction progress rate of 62%
Yokosuka	Full-scale construction started in August 2019. Construction progress rate of 55%
Goi	Full-scale construction started in April 2021. Construction progress rate of 24%
Taketoyo	Full-scale construction started in April 2018. Construction progress rate of 97%

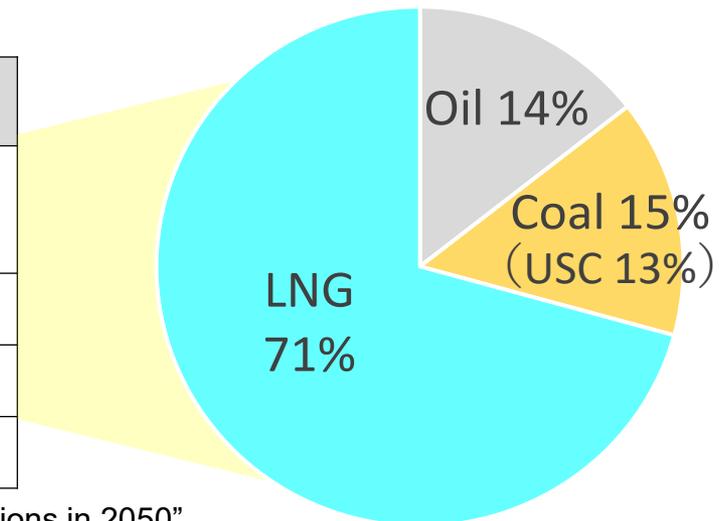
Domestic Thermal Power Generation and Gas Supply Business: Composition of Power Sources



- 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)	10.32GW (8.92GW)
LNG* ³	49.23GW
Oil	10.05GW
Total	69.60GW

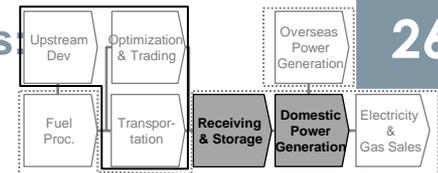


*¹ Press release on October 13, 2020 “Towards Zero CO₂ Emissions in 2050”

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

*² As of December 31, 2021. Includes capacity under construction.
Excludes capacity of affiliates.

*³ Includes LPG and City Gas.

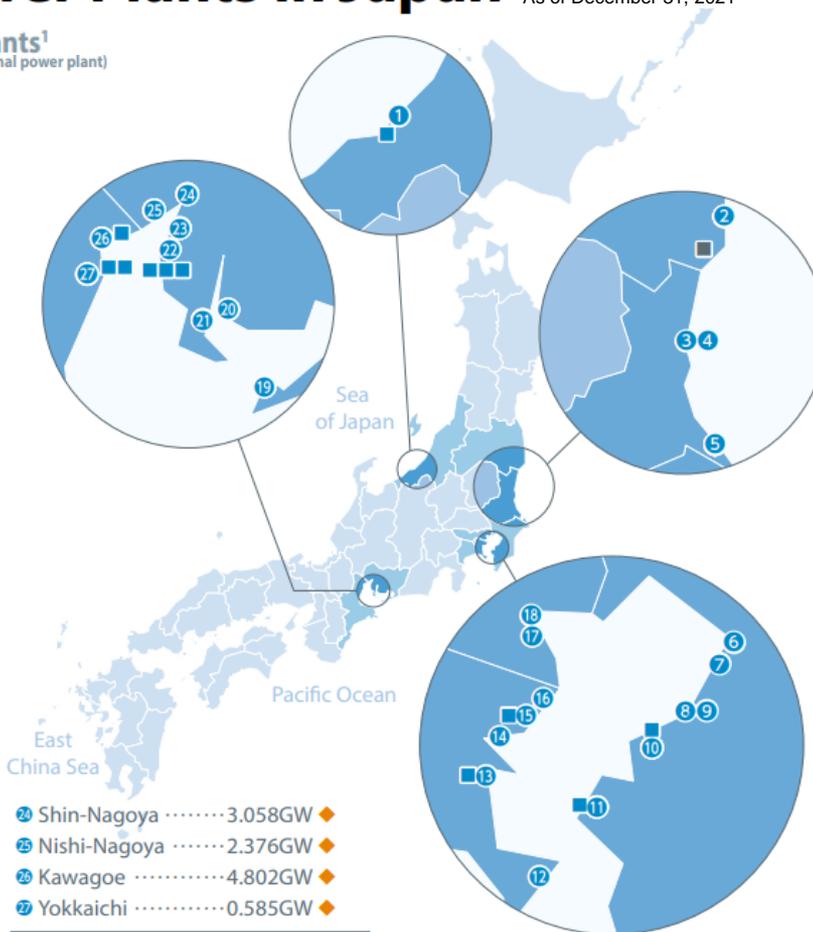


Thermal Power Plants in Japan

As of December 31, 2021

List of Thermal Power Plants¹
 (Total output and fuel type listed for each thermal power plant)

- ① Joetsu2.38GW ◆
- ② Hirono4.4GW ◆◆◆
- ③ Hitachinaka2GW ◆
- ④ Hitachinaka Kyodo
 <HITACHINAKA GENERATION>
0.65GW ◆
- ⑤ Kashima5.66GW ◆◆◆
- ⑥ Chiba4.38GW ◆
- ⑦ Goi<GOI UNITED GENERATION>
2.34GW /◆
 (*Scheduled to start operation in fiscal 2024.)
- ⑧ Anegasaki1.2GW ◆
- ⑨ Anegasaki<JERA Power ANEGASAKI>*
1.941GW ◆
 (*Scheduled to start operation in fiscal 2023.)
- ⑩ Sodegaura3.6GW ◆
- ⑪ Futtsu5.16GW ◆
- ⑫ Yokosuka<JERA Power YOKOSUKA>*
1.3GW ◆
 (*Scheduled to start operation in fiscal 2023.)
- ⑬ Minami-Yokohama ...1.15GW ◆
- ⑭ Yokohama3.541GW ◆
- ⑮ Higashi-Ohgishima2GW ◆
- ⑯ Kawasaki3.42GW ◆
- ⑰ Oi1.05GW ◆
- ⑱ Shinagawa1.14GW ◆
- ⑲ Atsumi1.4GW ◆◆
- ⑳ Hekinan4.1GW ◆
- ㉑ Taketoyo<JERA Power TAKETOYO>*
1.07GW ◆
 (*Scheduled to start operation in fiscal 2022.)
- ㉒ Chita3.966GW ◆
- ㉓ Chita Daini1.708GW ◆
- ㉔ Shin-Nagoya3.058GW ◆
- ㉕ Nishi-Nagoya2.376GW ◆
- ㉖ Kawagoe4.802GW ◆
- ㉗ Yokkaichi0.585GW ◆



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



Futtsu Thermal Power Station



Kawagoe Thermal Power Station

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

JERA Zero CO₂ Emissions 2050

- JERA's mission is to provide cutting-edge solutions to the world's energy issues.
- In order to help achieve a sustainable society, JERA, in the course of carrying out its mission, is taking on the challenge of achieving zero CO₂ emissions* from its business both in Japan and overseas.

The Three Approaches of JERA Zero CO₂ Emissions 2050

1. Complementarity between Renewable Energy and Zero CO₂ Emission Thermal Power Generation

JERA will achieve Zero CO₂ emissions through a combination of renewable energy and zero CO₂ emission thermal power generation. The adoption of renewable energy is supported by thermal power generation capable of generating electricity regardless of natural conditions. JERA will promote the adoption of greener fuels and pursue thermal power that does not emit CO₂ during power generation.

2. Establishment of Roadmaps Suitable for Each Country and Region

Zero CO₂ emissions will be achieved by establishing roadmaps that show optimal solutions for each country and region. Since the energy situation is different for each country and region—such as the presence of regional transmission lines or pipelines and the types of renewable energy that could be adopted—JERA will work with stakeholders on a country and regional basis to establish roadmaps. We have developed a roadmap for our business in Japan and will extend this approach to other countries and regions.

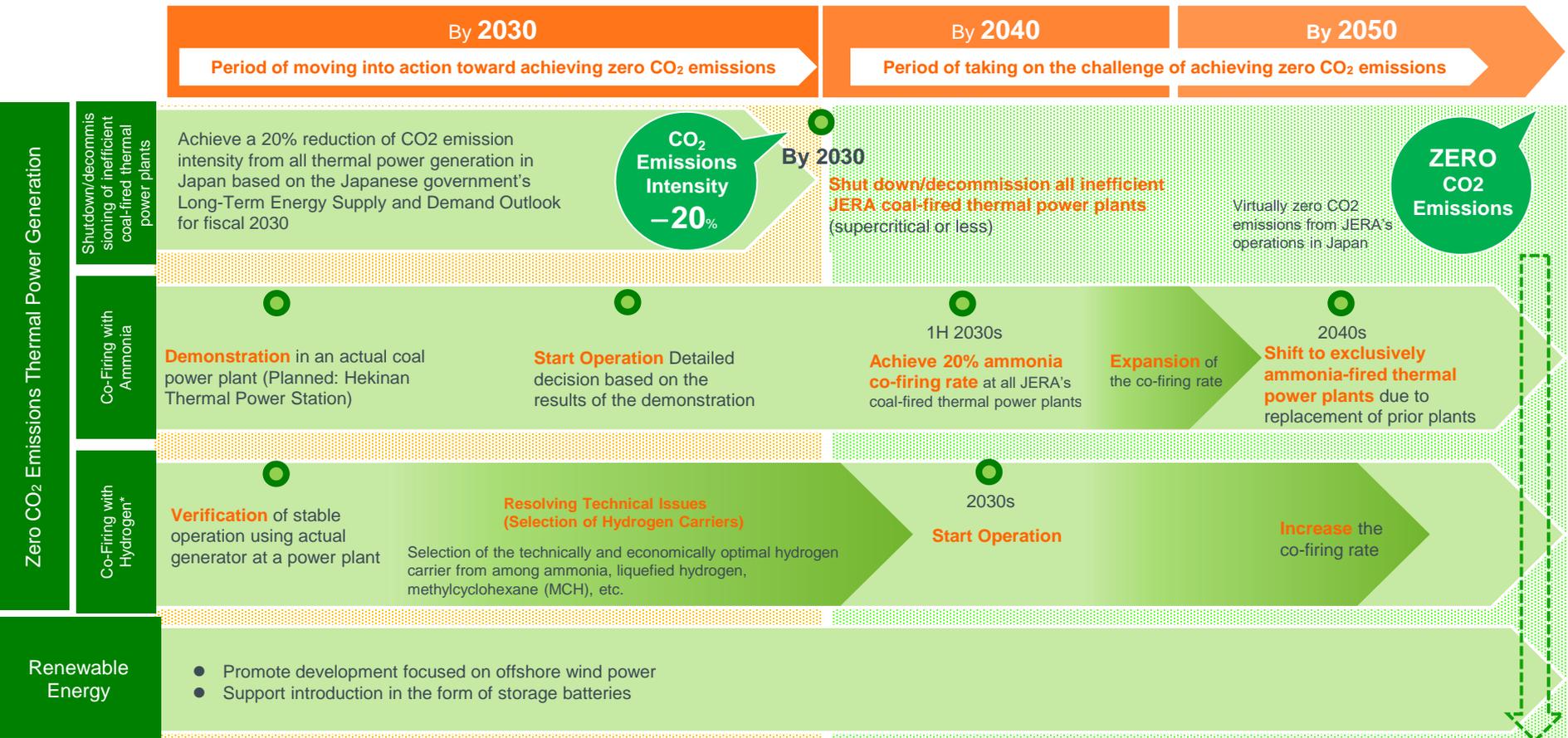
3. Smart Transition

Zero CO₂ emissions will be achieved through a combination of technologies that are available and reliable at the time adoption decisions are made, lowering technical risk and smoothing the transition to a green society.

*"JERA Zero CO₂ Emissions 2050" is premised on steady advances in decarbonization technology, economic rationality, and consistency with government policy. JERA is developing its own decarbonization technologies and taking the initiative to ensure economic rationality.

JERA Zero CO₂ Emissions 2050 Roadmap for its Business in Japan

JERA Zero CO₂ Emissions 2050 Roadmap for its Business in Japan



This roadmap will be gradually developed in greater detail based on relevant conditions such as government policies. JERA will revise the roadmap when relevant conditions change significantly.

*The use of CO₂-free LNG is also being considered.

CO₂ emitted from power plants that cannot be exclusively ammonia-fired as of 2050 will be offset using offset technology or by CO₂-free LNG

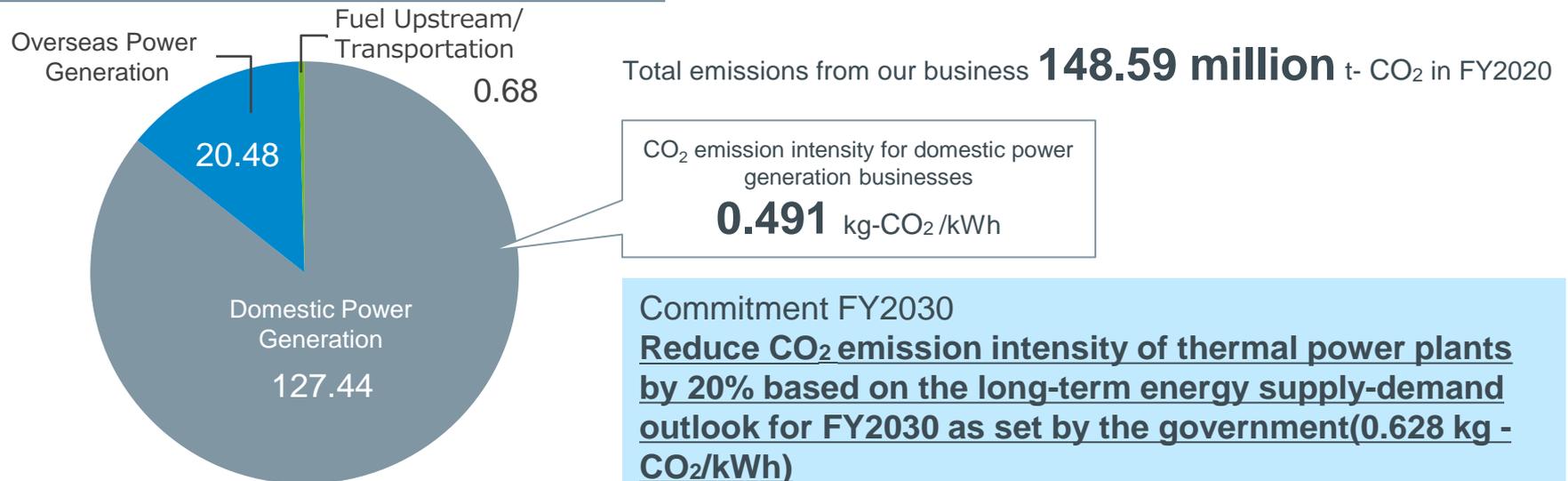
JERA Environmental Target 2030 for its Business in Japan

JERA is actively working to reduce CO₂ emissions. In domestic operations, JERA will achieve the following by FY2030:

- Shut down all inefficient (supercritical or less) coal power plants and conduct demonstration tests of mixed combustion with ammonia at high-efficiency (ultra-supercritical) coal power plants
- Promote the development of renewable energy centered on offshore wind power projects and work to further improve the efficiency of LNG thermal power generation
- Reduce CO₂ 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 Environmental Target 2030 for its Business in Japan" are premised on steady advances in decarbonization technology, economic rationality, and consistency with government policy. JERA is developing its own decarbonization technologies and taking the initiative to ensure economic rationality.

Reference: CO₂ Emissions/ CO₂ Emission Intensity



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.

As of January 7, 2022



Fuel upstream development

Fuel upstream development Fuel

- Signed Memorandum with Petronas on cooperation in the decarbonization field
- Consideration of cooperation with Yara International in the development of blue ammonia production projects
- Joint study on feasibility of clean ammonia production project in the United Arab Emirates
- 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



Transportation and storage

Fuel transportation



Fuel receiving and storage

- Investment in Hydrogenous 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, and Yamagata prefectures
- Start of demonstration of energy storage system data platform
- Gunfleet Sands offshore wind farm in the United Kingdom and Formosa 1~3 offshore wind farm in Taiwan
- Investment in Zenobē Energy Limited, a UK storage cell operator
- Development of onshore wind power and solar power generation in North America
- Participation in US El Sauz Wind Power Project in the United States
- Investment in ReNew Power Limited, a renewable energy power generation company in India

JERA Zero CO₂ Emissions 2050: Efforts toward 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.

Updates on Upstream development, transportation, storage of Ammonia

- Signed MOU with Yara International ASA, related to cooperation in the ammonia value chain business, including development of a blue ammonia production plant.
- Signed a joint study agreement with the Abu Dhabi National Oil Company (ADNOC) on exploring the commercial potential of clean ammonia production business in the United Arab Emirates (UAE).
- Considering collaboration with Yara international ASA and Idemitsu Kosan Co., Ltd. to expand the introduction of ammonia in Japan.
- Received the adoption of NEDO's "Green Innovation Fund Program / Establishment of Fuel Ammonia Supply Chains project / Research and Development of Innovative Ammonia Synthesis Catalysts" for the establishment of a fuel ammonia supply chain and started development and technical demonstration of a new catalyst for ammonia production.

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

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.
 - Started evaluation of operational and environmental characteristics for hydrogen utilization at existing LNG thermal power plants in Japan from October 2021 to March 2026.
- Modify the existing gas turbine at Unit 6 of Linden Gas Thermal Power plant in the United States for co-firing with hydrogen and the construction will be completed in 2022.

Updates on Transport and storage of hydrogen

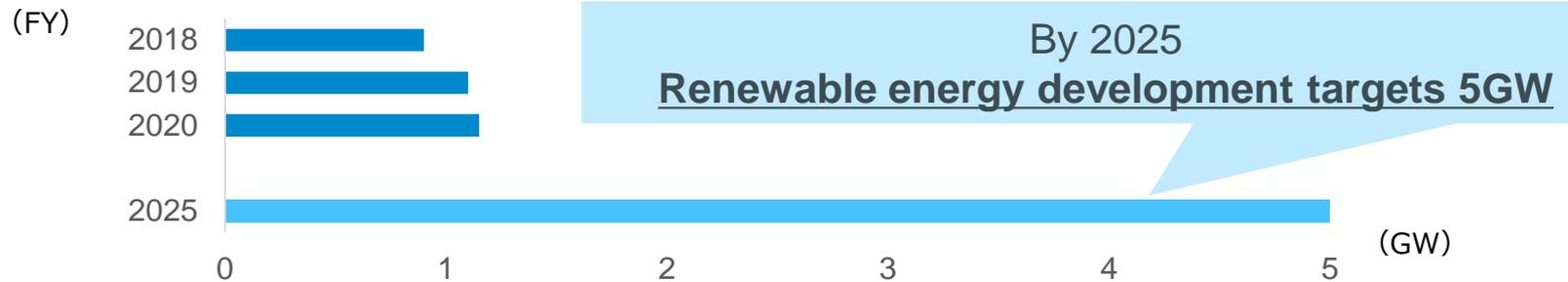
- Investment in Hydrogenious LOHC Technologies GmbH (“Hydrogenious LOHC”) which as a lead investor. Hydrogenious LOHC, which is headquartered in Erlangen, Germany, has been developing hydrogen storage and transportation technology. It possesses unique technology of Liquid Organic Hydrogen Carrier (“LOHC”) as one of hydrogen energy carriers.



Linden gas-fired power station

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

Status and Targets of Renewable Energy Development



Topics: Renewable Energy Development in the United States

- JERA established JERA Renewables NA, LLC to develop renewable energy projects in the United States. The experienced team of experts at JERA Renewables NA has been facilitate business development in the United States.
- JERA Renewable NA is working to develop approximately 2GW of JERA's overall 5GW renewable energy development targets.
- In December 2021, the company decided to participate in the El Sauz Wind Power Project onshore wind power generation project in Texas, in the United States.

◆ Overview of the El Sauz Wind Power Project in Texas in the United States

Location	Willacy County, Texas, United States
Generation capacity	Approx. 300MW
Start of construction	Early 2022
Start of operation	FY2022/4Q (Scheduled)

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.

Development sites	Power generation output	Status of development
Off Yuza in Yamagata Prefecture	Maximum 450 MW	<ul style="list-style-type: none"> Public Review of the Environmental Impact Assessment Scoping Document
Off the coast of Ishikari Bay, Hokkaido	Maximum 520 MW	<ul style="list-style-type: none"> Complete procedures for environmental impact assessment
Off the Happo Town and Noshiro City, Akita Prefecture	Maximum 356 MW	<ul style="list-style-type: none"> Public Review of the Primary Environmental Impact Consideration Document
Off the city of southern Tsugaru, Aomori Prefecture	Maximum 600 MW	<ul style="list-style-type: none"> Complete procedures for environmental impact assessment

- 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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