JERA
Energy for a New Era

JERA's Decarbonization Initiatives
~Ammonia Power Generation Demonstration Test Result at Hekinan Thermal Power Plant~

May 26, 2025
JERA Co., Ltd.

JERA's Value Chain Covers from Upstream to Downstream

LNG Transaction Volume[1]
Approx.36MTPA
Among the largest in the world

Total Assets
Approx. JPY
8.5trillion

Sales
Approx. JPY
3.7trillion[1]

As of August 31, 2024

Upstream Development Fuel Procurement

Photo: Chevron Australia

- Upstream Investment
  6Projects
- LNG Procurement from
  15countries

Fuel Transportation

- LNG Fleet Carriers
  19 carriers

Optimization and Trading

LNG Receiving and Storage Terminals

- LNG Tank Capacity in Japan
  6.65million kL[3]
- Equivalent to
  Approx. 30% of LNG tank capacity in Japan
- LNG Receiving Terminals in Japan
  11 terminals[3]

Domestic and Overseas Power Generation

Domestic Power Generation

- Thermal Power Station
  26stations[4]
- Power Generation Capacity
  Approx.61GW
  The Largest in Japan
- Power Generation Output
  Approx.235TWh[1,4]
  Equivalent to approx. 33% of power generation in Japan

Overseas Power Generation

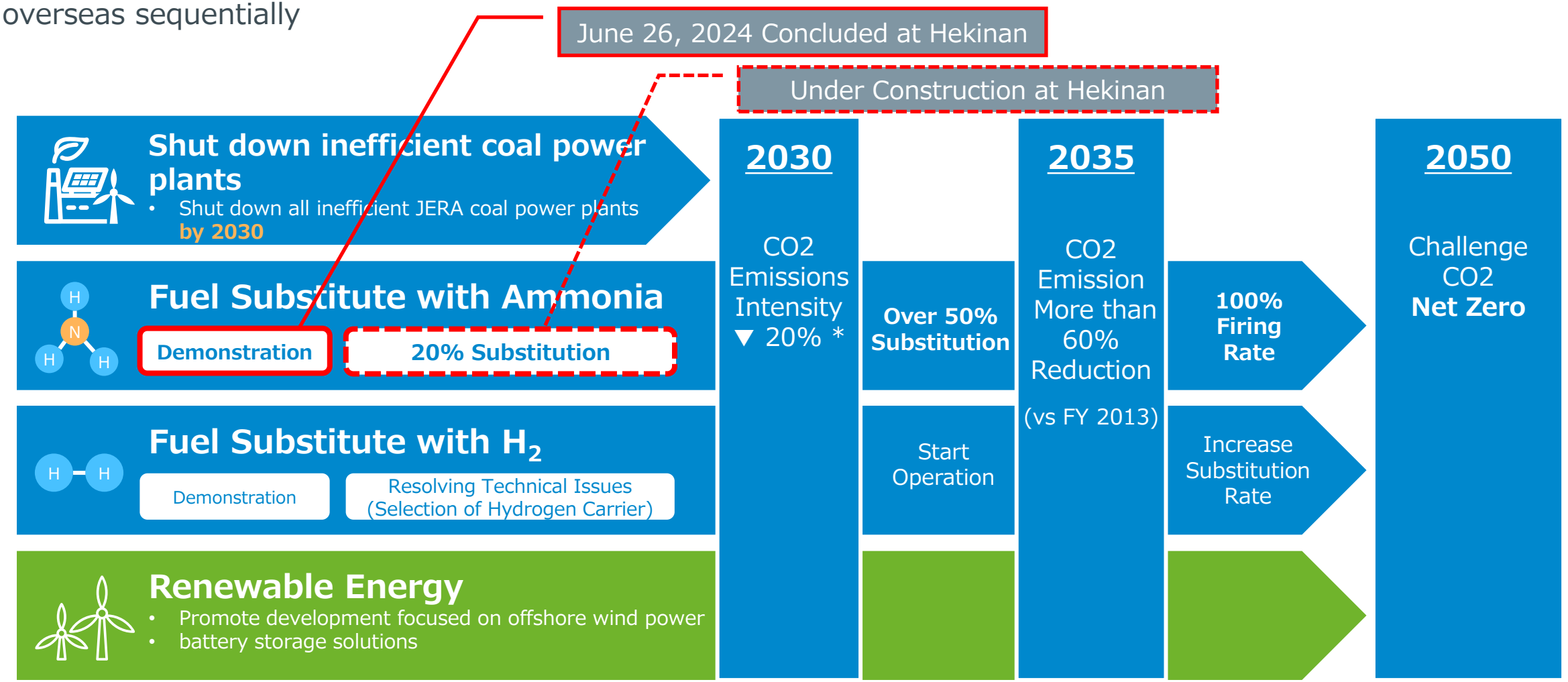
- Number of projects
  In more than 10Countries
  Approx.30Projects
- Power Generation Capacity
  Approx.12.4GW[4]
  (Output Corresponding to Equity)
- Renewables Development Capacity
  Approx.2.5GW
  (Included Power Generation Capacity)

Electricity and Gas Sales

1:Fiscal 2022
2:Represents the number of countries that imported LNG to LNG receiving terminals of JERA.
3:Includes jointly operated terminals in Chita and Yokohama
4: Includes capacity under construction. Excludes joint thermal power in Japan.

JERA Zero CO2 Emissions 2050 Roadmap for its Business in Japan

- JERA is taking on the **challenge of achieving, by 2050, Zero CO2 emissions** in Japan and overseas.
- The path to zero emissions varies depending on the situation of the economy or region. Develop optimal roadmap overseas sequentially



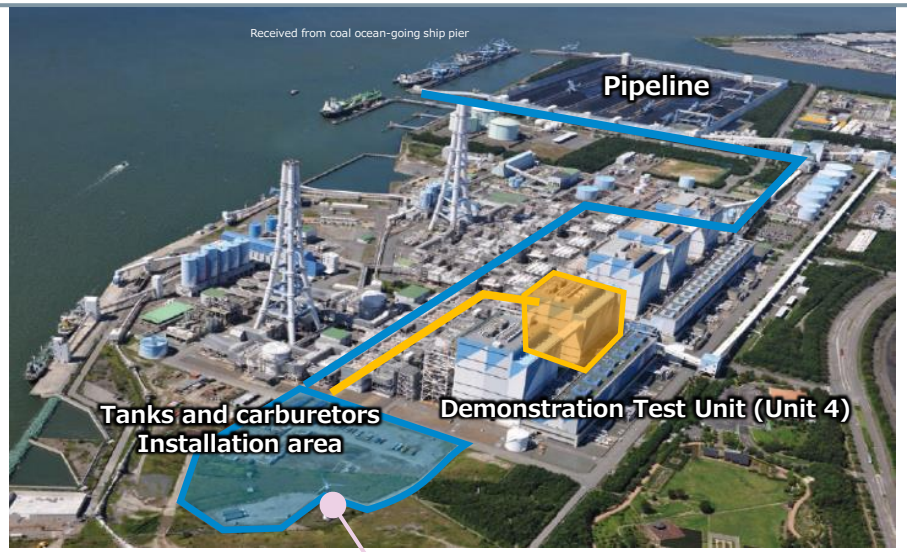
*Compared with the emissions intensity of thermal power generation for the whole economy based on the long-term energy supply and demand forecast for FY 2030 presented by the government.

Ammonia Power Generation Demonstration Project at Hekinan Thermal Power Station

- The target plant for the test is Hekinan Thermal Power Units 4 and 5, which are coal-fired boilers delivered to IHI Co., Ltd. (Hereinafter, IHI). Unit 4, which was scheduled for a regular inspection in 2023, was selected to carry out burner remodeling work in line with the regular inspection.

Outline of Demonstration Project

Subject	NEDO Grant-in-Aid Project "Carbon recycling and next-generation thermal power generation technology development/Ammonia mixed combustion thermal power generation technology R & D and demonstration project"
Project entity	JERA × IHI
Project Description	At Hekinan Thermal Power Station Unit 4 (output: 1,000 MW), **20%** of coal fuel is substituted to ammonia, and actual thermal power plant operation data is collected and evaluated to realize social implementation.
Test period	2024.4. 1 to 2024.6.26 (53 days of test)
NH_3 Amount used	Approx. 30,000 t

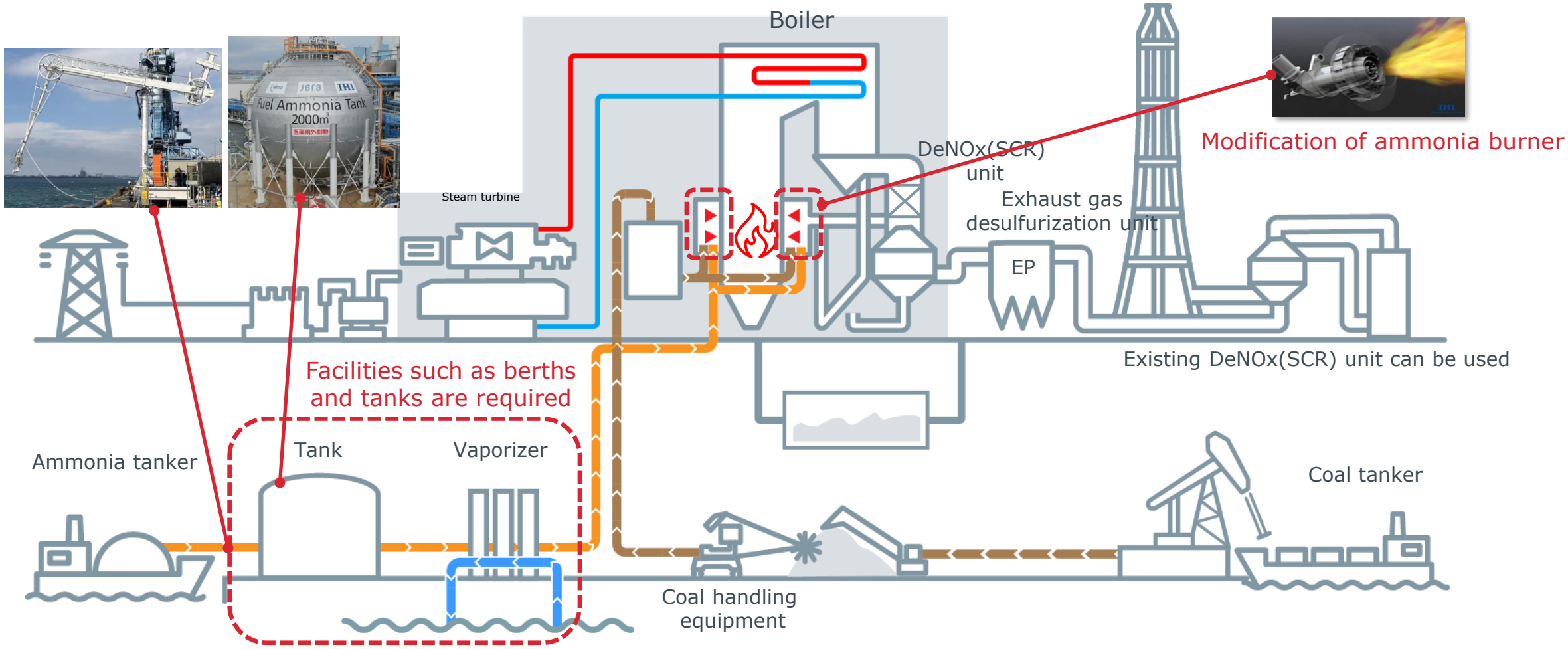


years	2024				
	February	March	April	May	June
Overview of the demonstration test process (Results)	First receipt of fuel ammonia	Ignition	20% substitution achieved		Concluded demonstration test

Outline of Required Modification for Ammonia Substitution

- Jera makes modification works for Ammonia in Hekinan Unit 4.
- Small modification is required, but the most of existing facility and DeNOx (SCR*) unit for treatment of exhaust gas can be used.

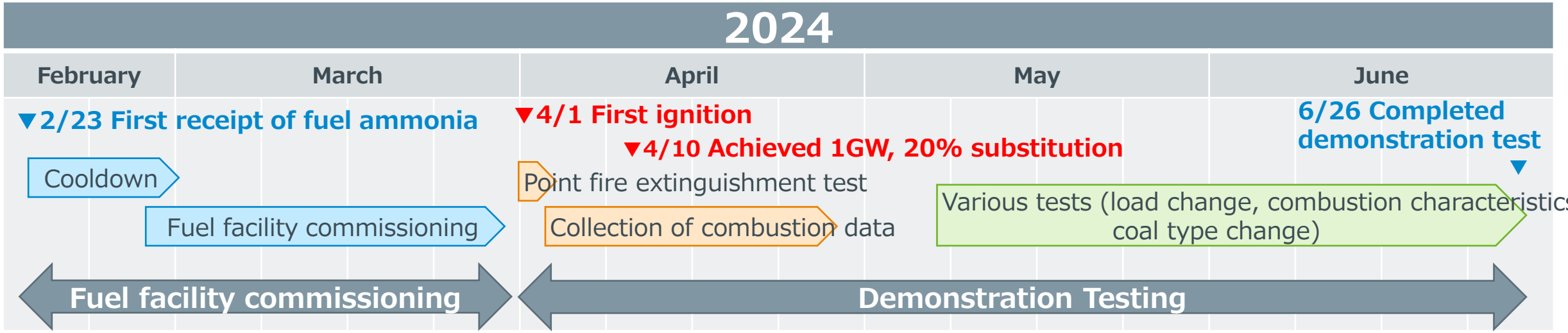
*Selective Catalytic Reduction



Results of ammonia 20% substitution demonstration test

- 20% substitution at 1,000 MW was achieved on April 10th. NOx (Nitrogen oxide) was confirmed to be equal or lower than that before ammonia substitution (coal burning). No emission of N_2O (Nitrous oxide), which has a strong greenhouse effect, was confirmed and the test was completed on June 26th.

[Actual schedule]



[Test results]

Item	Plant operating performance	Exhaust gas characteristics			
		NOx	N_2O	SOx	Soot and dust
Results (coal comparison)	Coal equivalent	Coal equal or lower	Not detected	Approximately 20% reduction	Approximately 20% reduction
	○	○	○	◎	◎

Safety Measures

➢ Measures to prevent ammonia leakage

❶ Prevention

- **Safety design** (design with allowance for one of the largest natural disasters expected)
- **Safe side operation** (Mechanism to operate on the safe side even if equipment fails)
- **Backup** (Do not create a situation where safety equipment does not function due to a single facility failure)
- **Interlock** (wrong operation is not accepted by the machine)
- **Operation Manual** (Thorough prevention of operation errors)

❷ Early detection and treatment

- **Device for reporting by leak detection**
- **Device for automatic stop due to equipment abnormality**
- **Monitoring camera and patrol** (Detection of abnormal signs)
- **Procedure Manual** (Thorough Expedited Procedures)

❸ Prevention of spread

- **Liquid barrier wall** (Prevention of outflow from facilities)
- **Recovery Facilities** (containment)
- **Response manual** (Thorough emergency response)
- **Cooperation with community** (Fire departments and local governments)

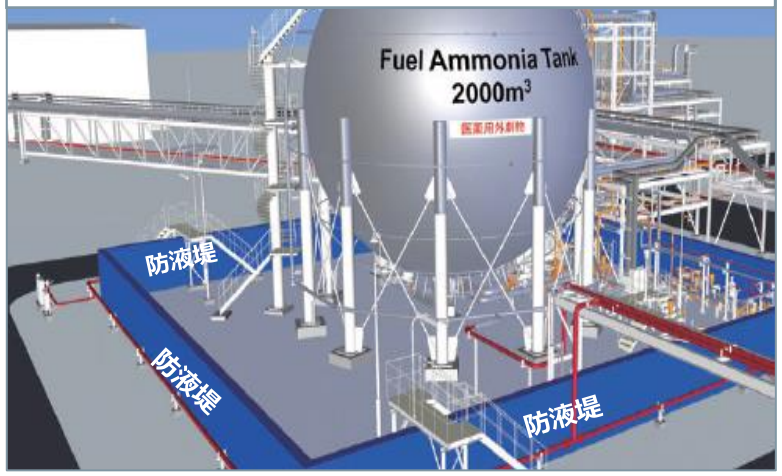
Safety Measures for Ammonia Use

- Implementation of all possible safety measures, while maintaining communication to ensure the understanding and reassurance of local community.

Safety Measures and Communication with the Local Community

Early detection and action: 24-hour monitoring, patrol inspections, etc.

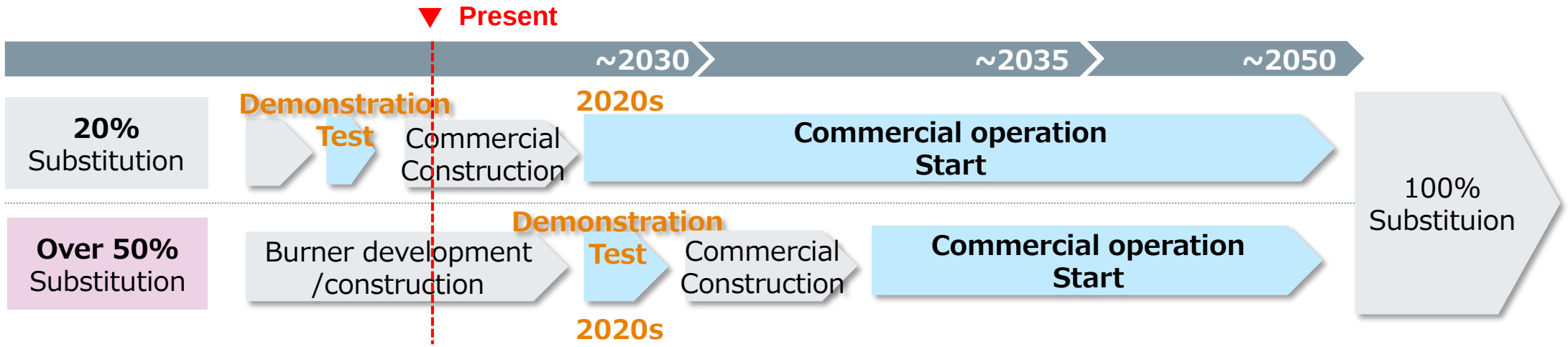
Prevention of accidents: Safety design (shock resistance, countermeasures against tsunami and high tides, etc.)
Prevention of damage spread: Liquid-proof dike, emergency shutdown function, etc.



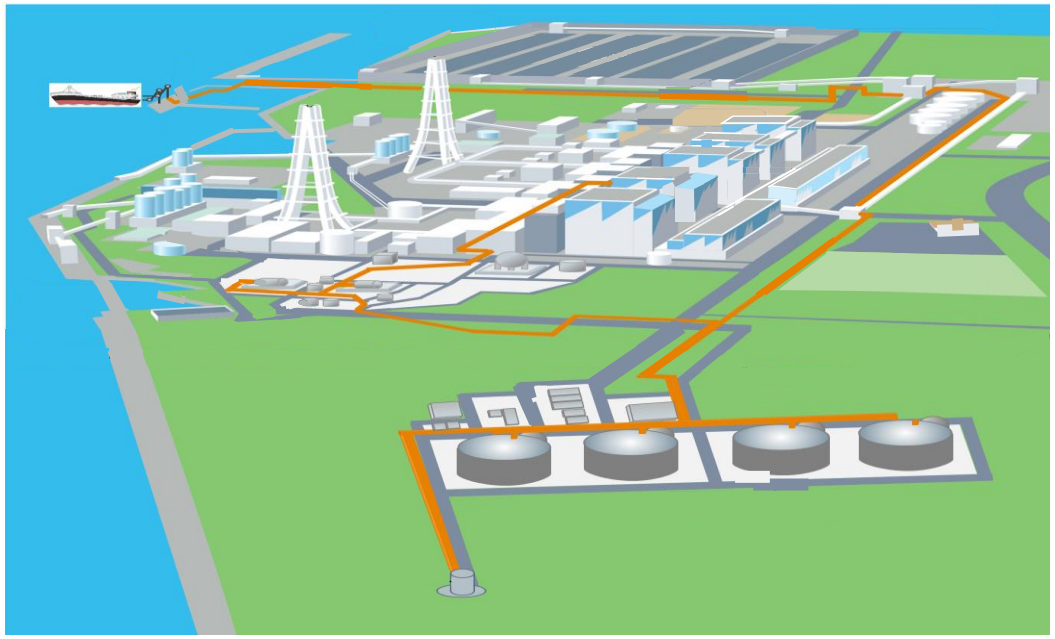
Gain Understanding from the local Community

- ✓ Sharing knowledge about ammonia and its safety measures through communication with local communities such as fire departments
- ✓ Safety drills are planned and implemented in cooperation with the fire department. Safety measures are promoted alongside the local community.

Future Development of Hekinan Thermal Power of Ammonia substitution



Completion image



Construction site (Feb 2025)

Feasibility Study for Ammonia Substitution - BLCP Project in Thailand

- JERA invested EGCO (Electricity Generating Public Company Limited, Thailand) and we had a MOU about future corroboration for decarbonization technologies.
- JERA was appointed by METI (Japanese Ministry of Economy) as a consultant for feasibility study on ammonia co-firing in coal fired power plant in Thailand. The purpose of this study is to promote exporting infrastructure made in Japan.

Country	Thailand
Power Plant	BLCP Power Plant, Sub Critical Coal Fired Power Plant 1,434MW (717MW × 2Unit)
Shareholder	EGCO 50%, Banpu 50%
Fuel	Imported top grade bituminous coal
Consortium	JERA, Mitsubishi Corporation, MITSUBISHI HEAVY INDUSTRIES, NIPPON KOEI

Study result

Item	Evaluation
Technical	There are no major issues.
Environmental/Society	Most of the environmental & social impacts expected from ammonia substitution would be technically mitigated enough to be negligible.
Commercial	The LCOE calculated in this FS is competitive with other power sources after 2030. In order to recover the necessary costs for modification, continued efforts will be necessary to obtain support from the government and other financial sources.
Regulations	Currently, there is no concrete system in place to introduce ammonia as fuel into thermal power generation facility.

50% Ammonia Substitution Demonstration Test - IHI

- Using the Green Innovation Fund*, IHI is developing a burner to substitute more than 50% of ammonia.
- Development of both small and large scale furnace is generally complete.
- Detailed studies are conducted for the actual demonstration test, including the scope of **boiler modification and supplying facilities.**

JERA × IHI

	2021	2022	2023	2024	2025~2030
Small Furnace Testing					
Large Furnace Testing					
Demonstration Test				FS	

Schedule of Testing

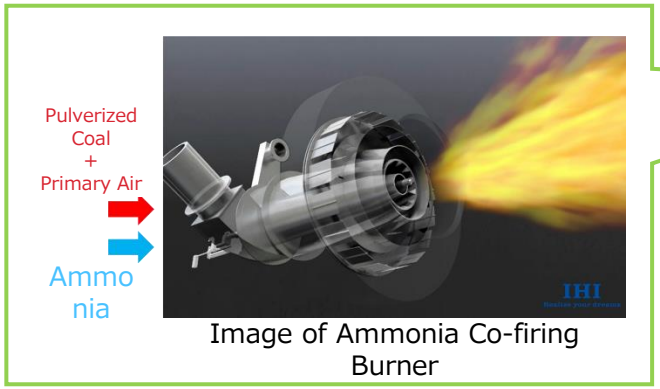
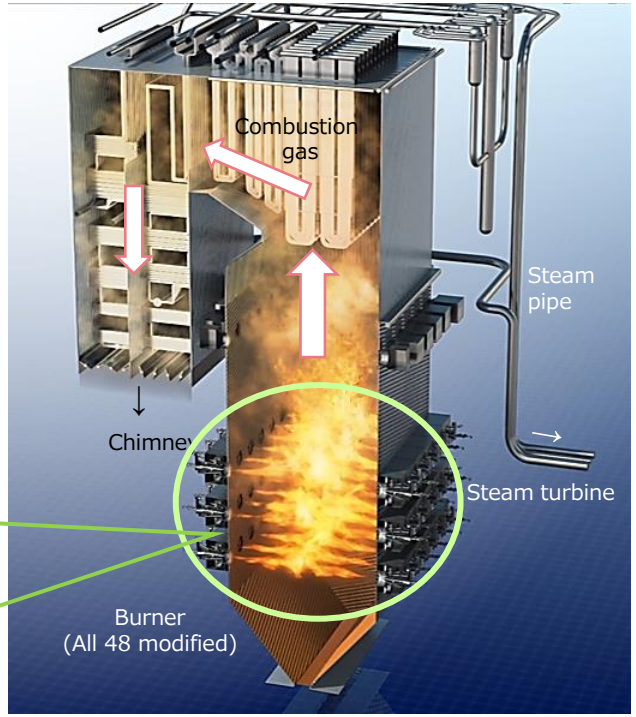


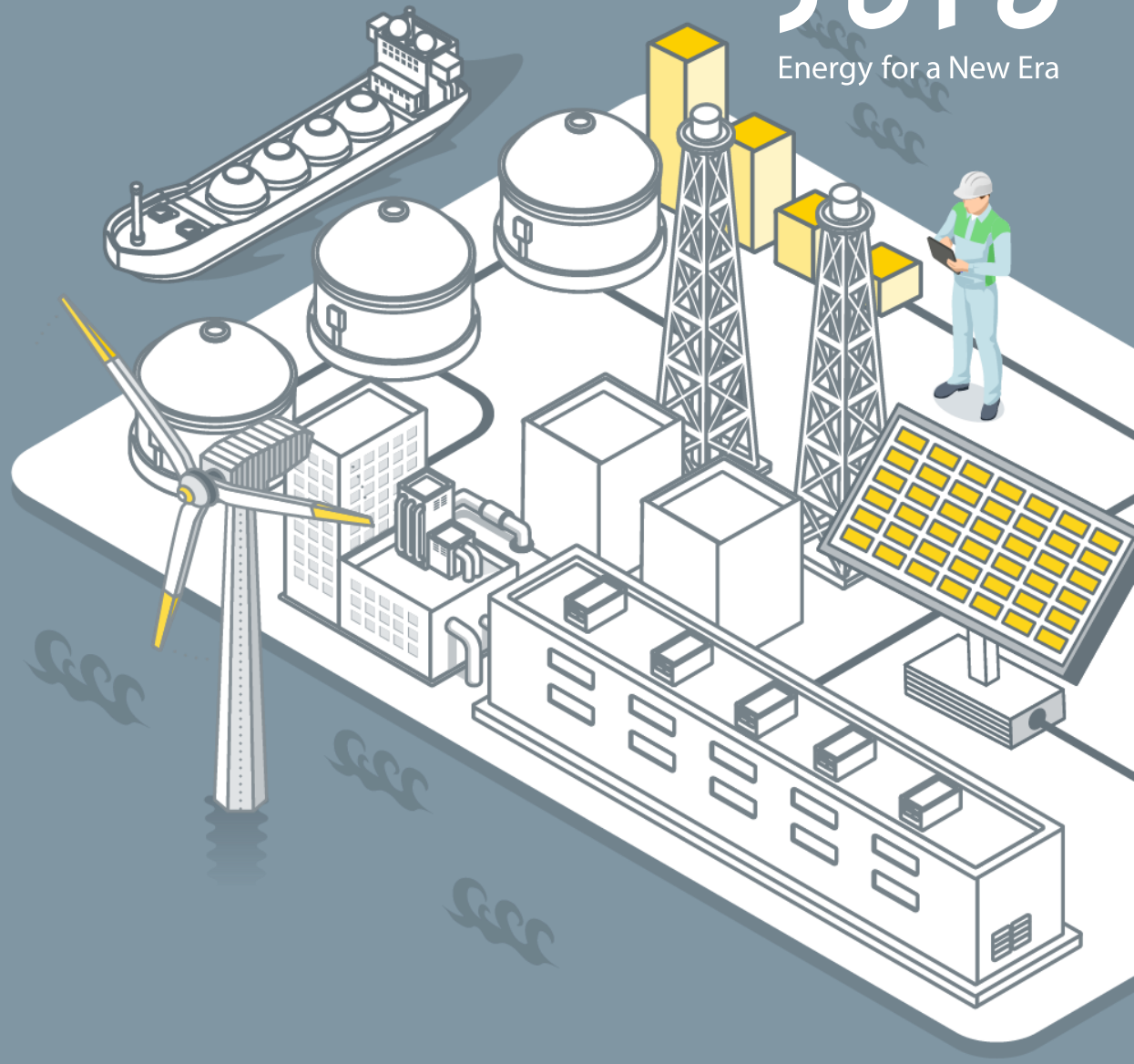
Image of Ammonia Co-firing Burner



Boiler

* Green Innovation Fund Project: Fuel Ammonia Supply Chain Establishment
"Development and Demonstration of High-Rate Ammonia Co-firing Technology in Coal Boilers"

Thank you for your attention.



Energy for a New Era