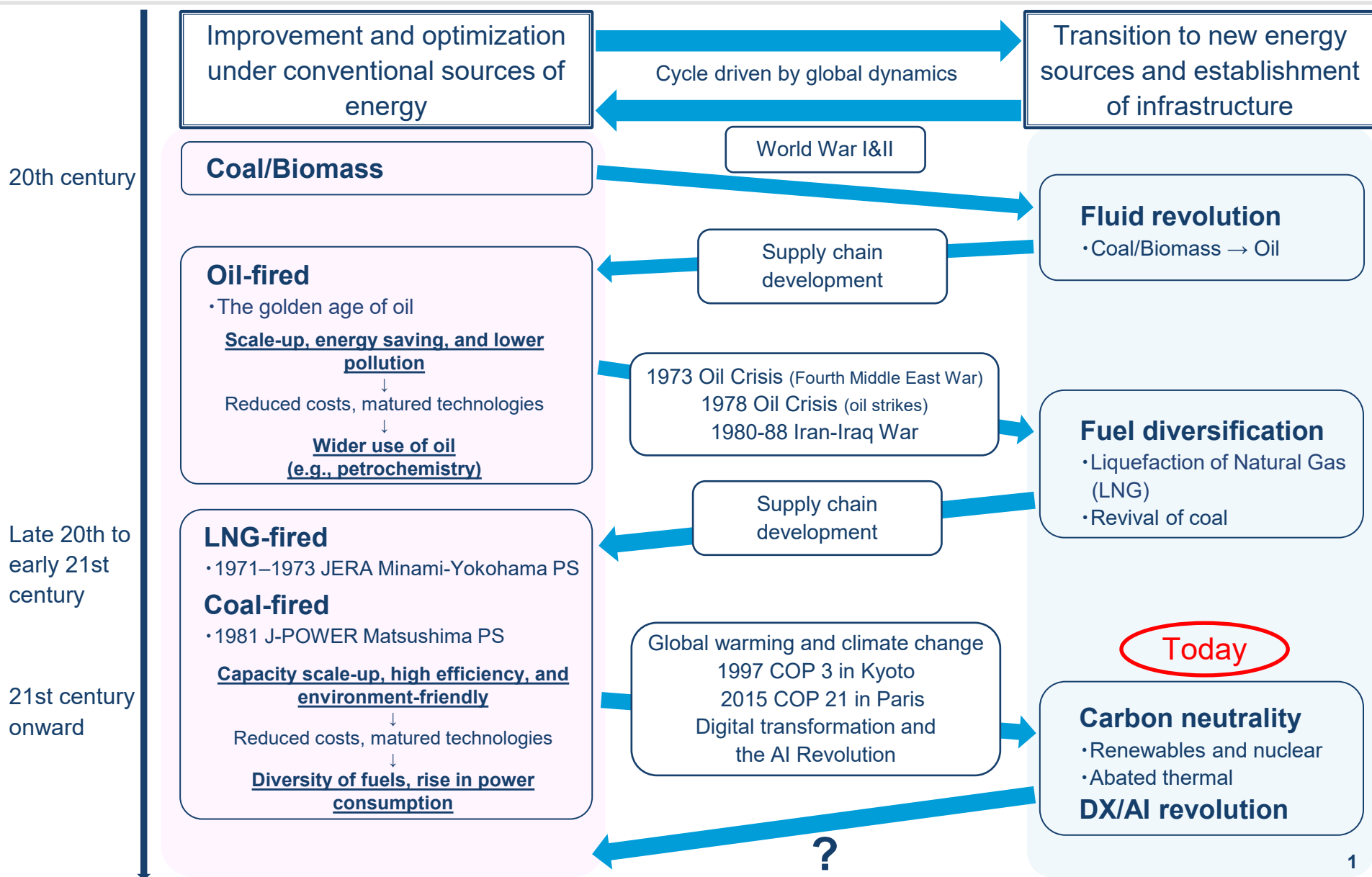


Towards True energy transition

September 4, 2025
J-POWER

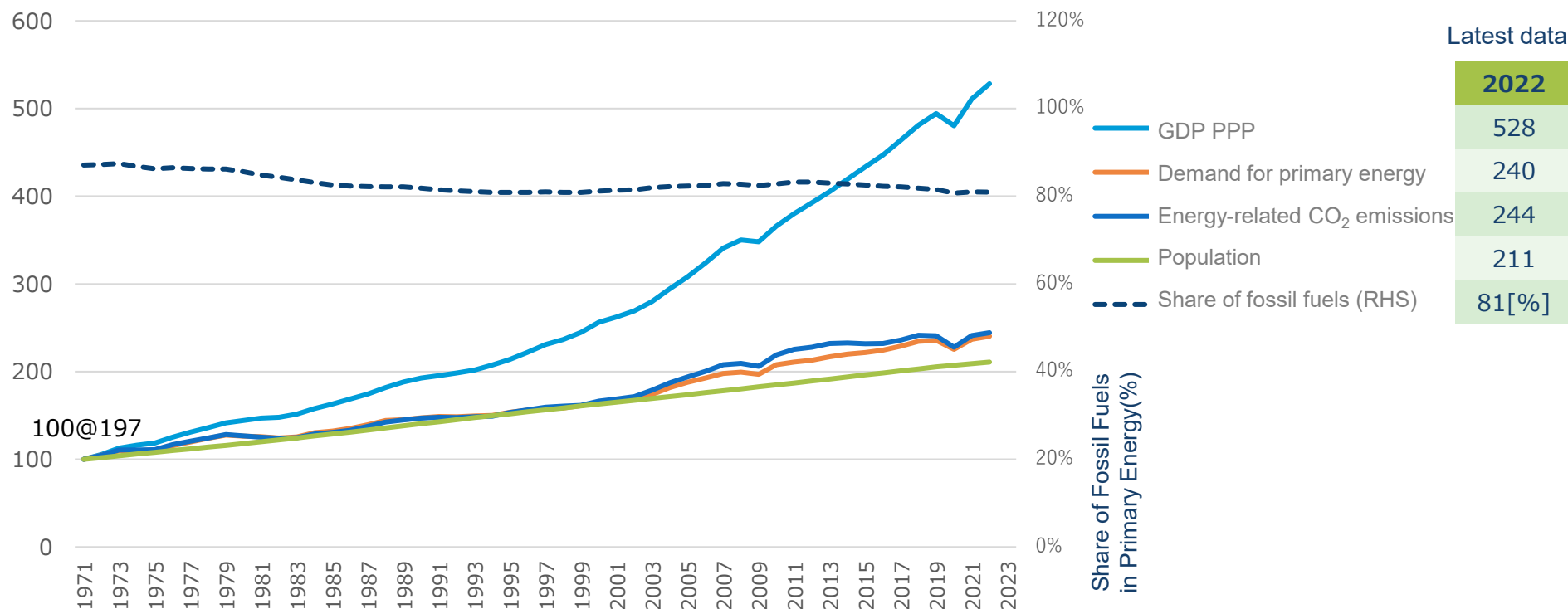
Energy Transition



GDP, Population, Energy Demand, CO₂ Emissions

Over the past 50 years and more

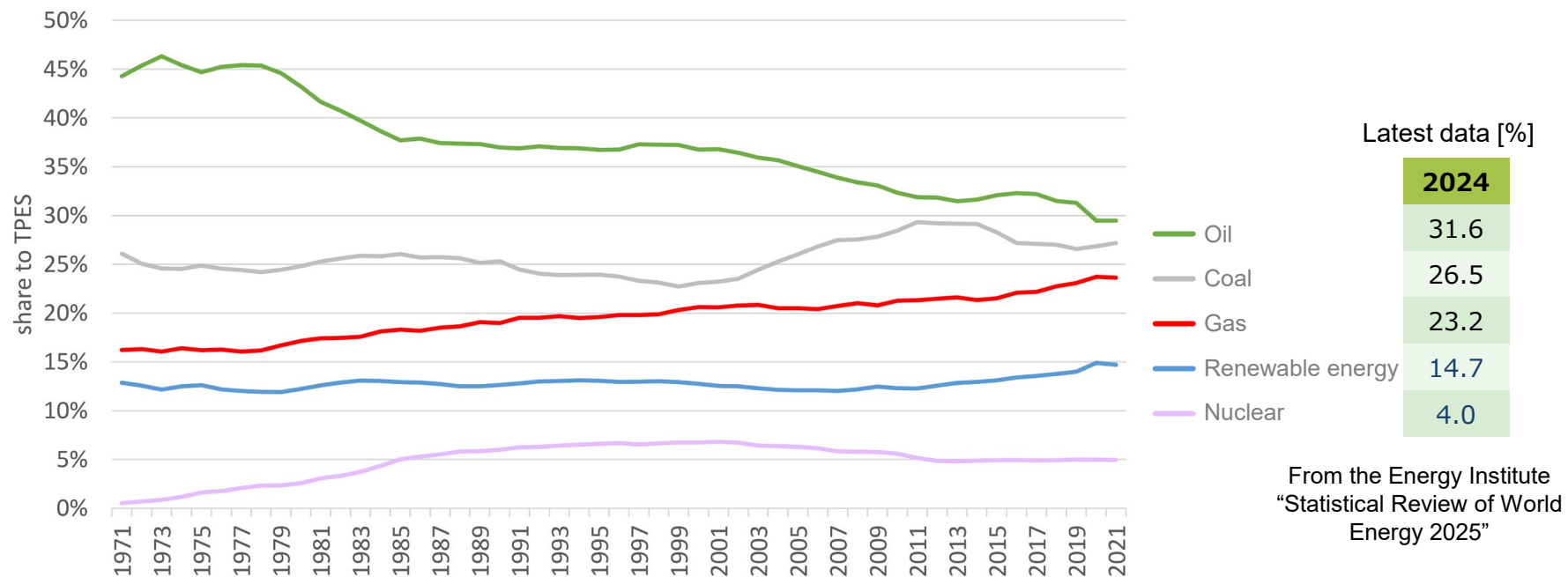
- Even today, GDP, population, energy demand, and CO₂ emissions have all continued to increase globally.
- The following figure indicates the order;
Population < Energy-related CO₂ emissions ≈ Demand for primary energy < GDP PPP.
- The dashed black line in the figure represents the “Share of fossil fuels” in the primary energy basket, which has never less than 80% in the past 50 years. == Decarbonization has no progressed in the past 50 years.



Source: The graph was created based on IEA World Energy Balance 2024

Share of Primary Energy Supply by Source

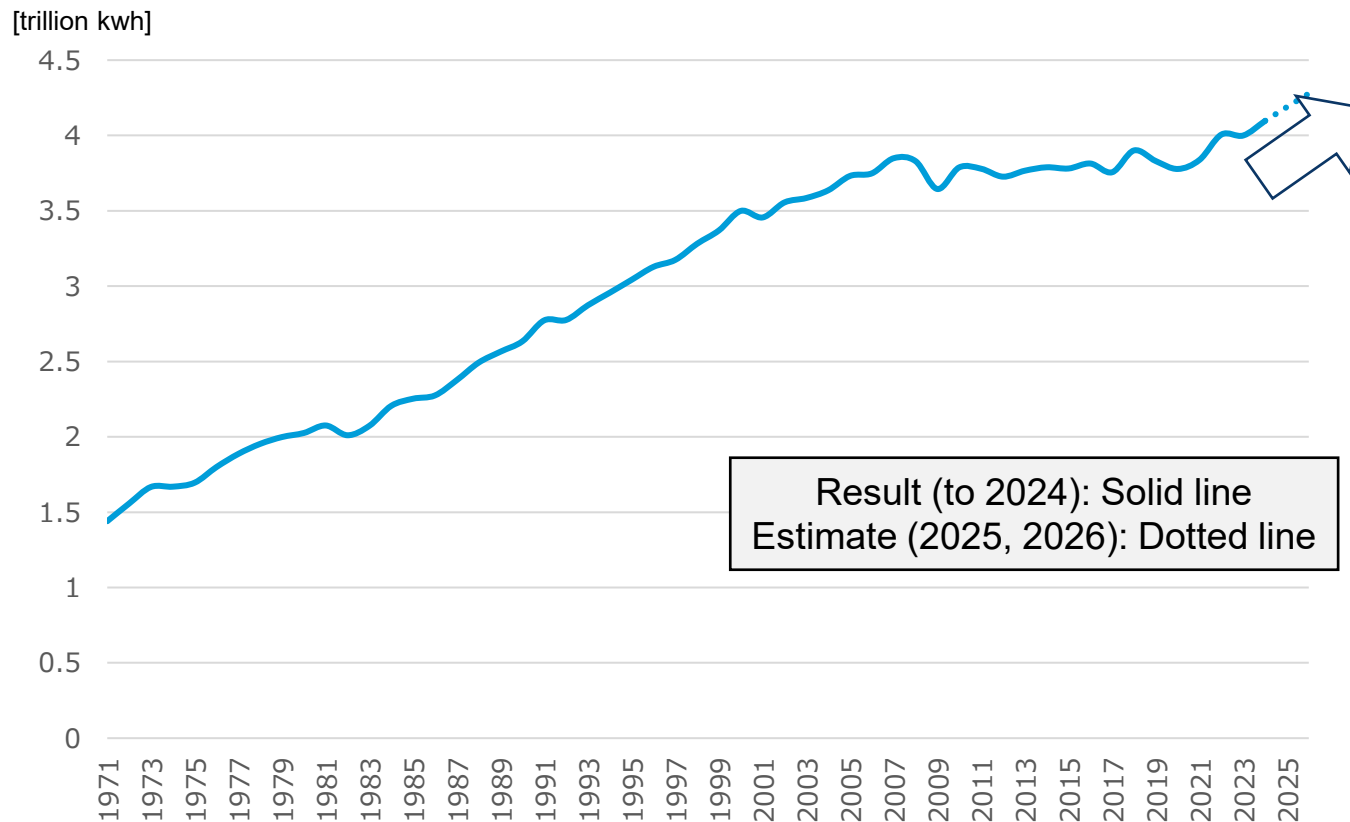
- Over the past 50 years and more, the order of primary energy share has remained the same—namely, **oil at the top, followed by coal, gas, renewable energy, and nuclear energy.**
- This can be attributed to factors such as economic efficiency, convenience and substitutability, as well as lock-in effects stemming from distribution infrastructure.



Source: The graph was created based on IEA World Energy Balance 2023.

Results and Estimates of Electricity Demand in U.S.

- In the U.S., the electricity demand is currently expanding due to increasing demand of artificial intelligence (AI) and data centers. There is an estimate that the electricity demand will increase by an average of about 2% annually to 2050.



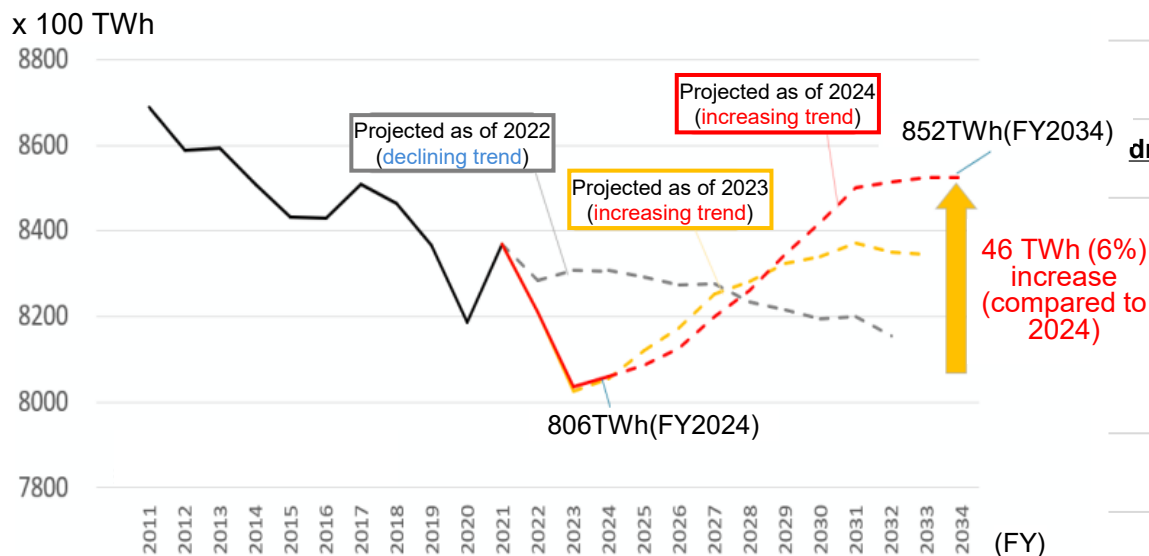
Source: IEA: World Energy Balances Highlights (September 2024) [to 2023]

EIA: Short-Term Energy Outlook (July 2025) [from 2024] *Predicted value for 2025 and later

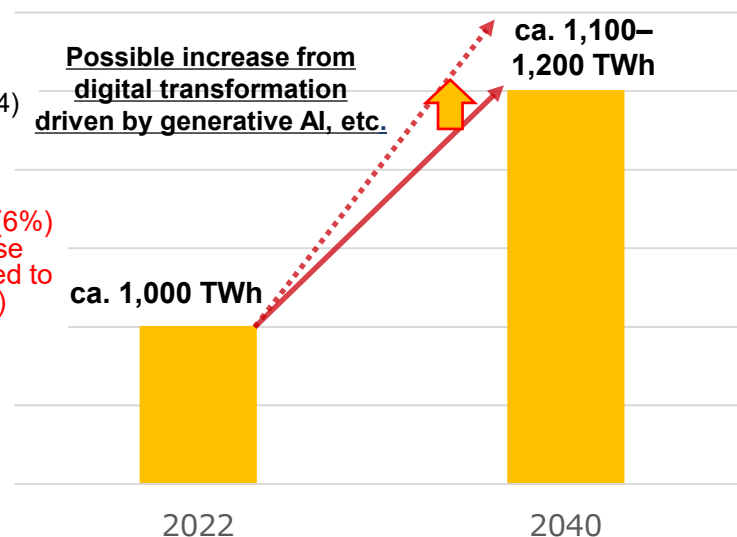
Estimates of Electricity Demand in Japan

- According to the forecast of the electricity demand for the next 10 years by the Organization for Cross-Regional Coordination of Transmission Operators, Japan (OCCTO), while the demand for the household sector will decrease, the industrial sector will increase significantly.
- The power generation in 2040 forecasted by the Seventh Strategic Energy Plan is that it estimates the annual rate to increase by 0.52% to 1.04%.
- Although the U.S. is ahead, it is expected that the increase in the electricity demand due to AI and data centers will also extend to Japan.

Forecast power demand in Japan



Forecast power generation in Japan

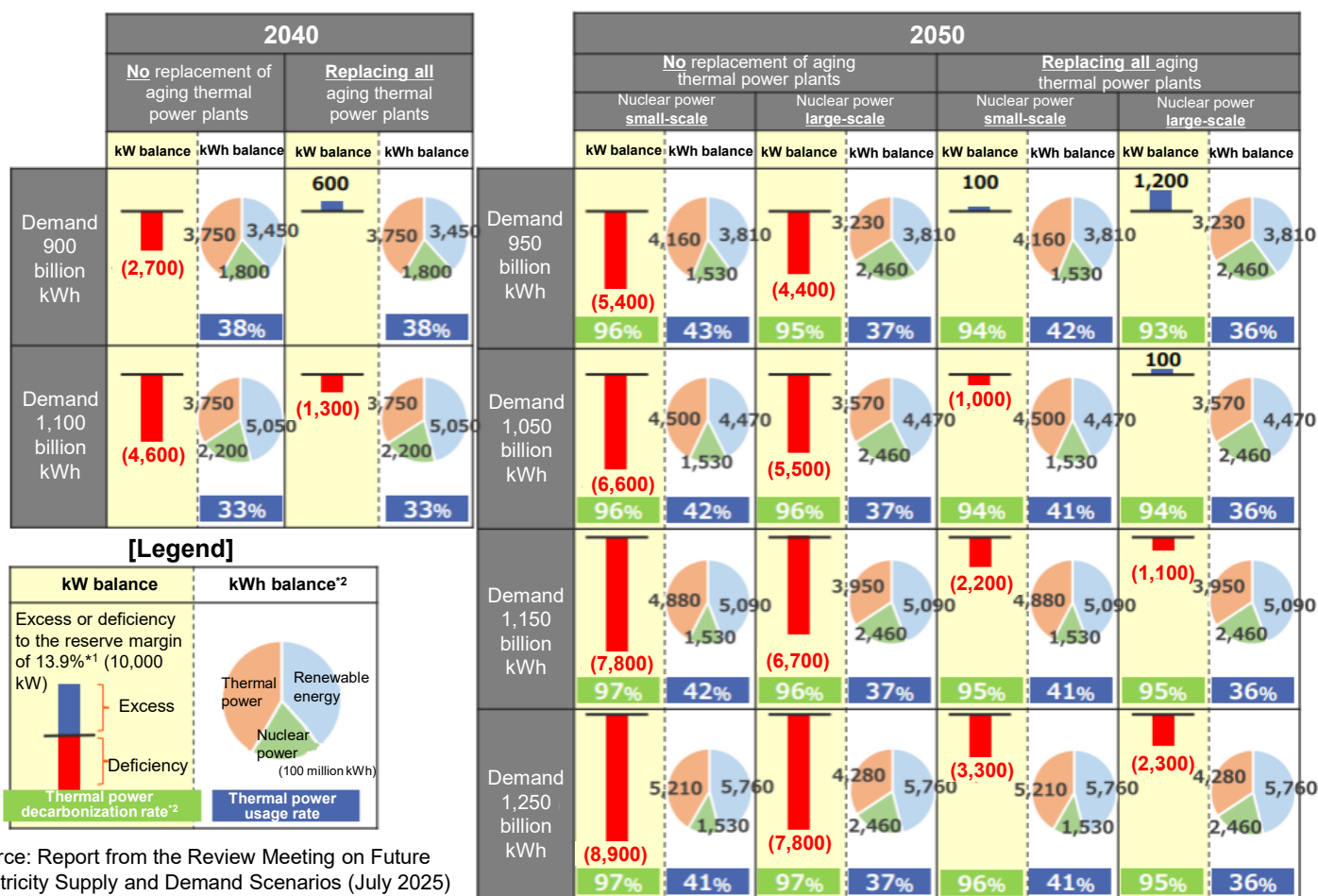


*The graph was created based on Demand Forecast for Japan and by Served Region 2025 by the Organization for Cross-regional Coordination of Transmission Operators (OCCTO).

Source: The 7th Strategic Energy Plan

Estimates of Power Supply Capacity of Japan

- While aging thermal power plants are retiring, in addition to the fade-out of inefficient coal-fired power plants, it is difficult to cover the electricity demand with renewable energy only.
- In the OCCTO estimation, shortage of kW (power supply) is expected if the demand increases even under a scenario where the replacement of thermal power plants progresses.

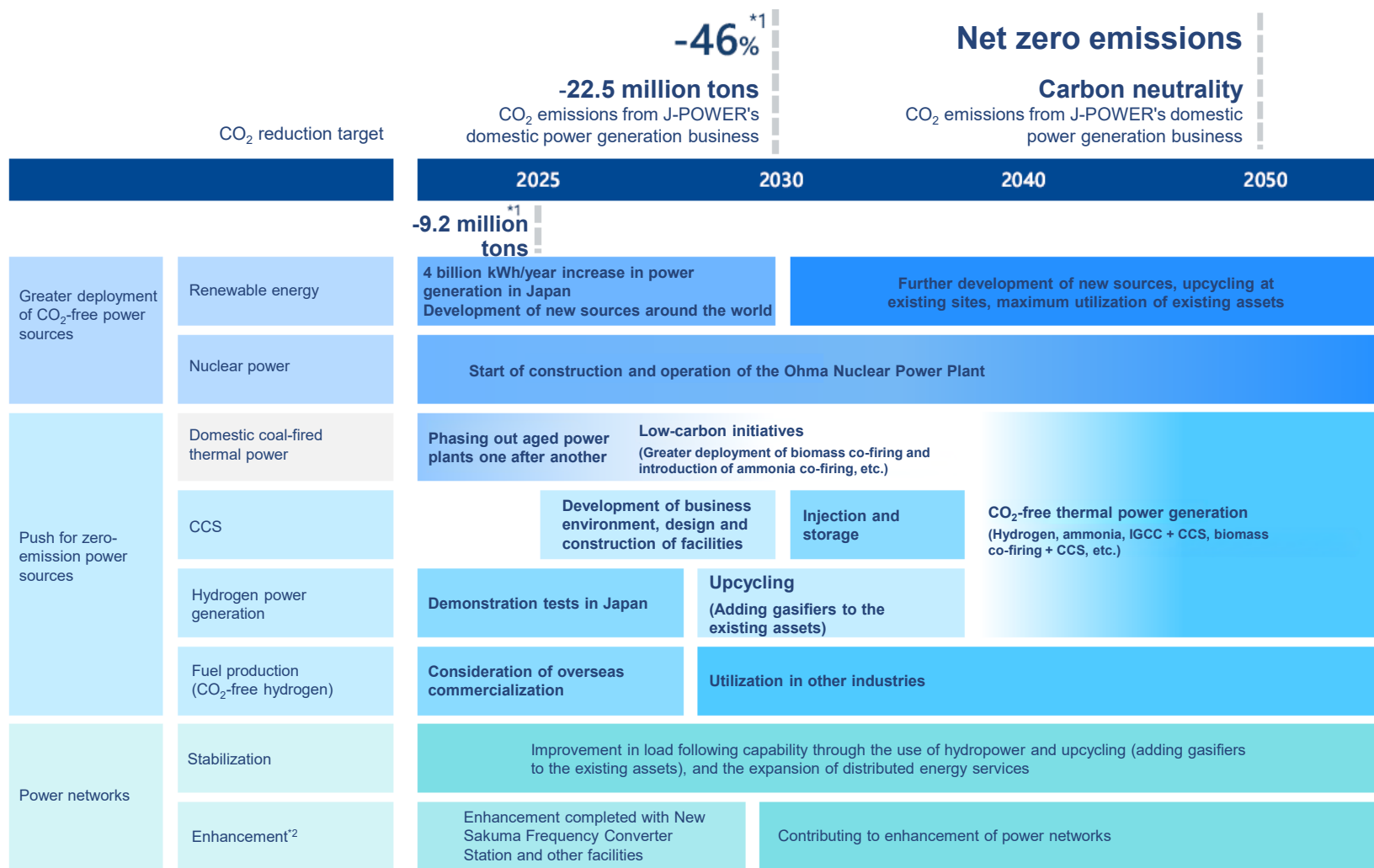


Source: Report from the Review Meeting on Future Electricity Supply and Demand Scenarios (July 2025)

Tentative Summary

- The energy transition is sought under the “Hydrocarbon World”.
- Depending on how the DX/AI revolution progresses, a kW/kWh shortage may occur in the future.
- While maintaining a power supply requirements, such as Sustainability, Affordability, Resiliency/Durability, it's necessary to respond to issues for Carbon Neutral Energy Transition

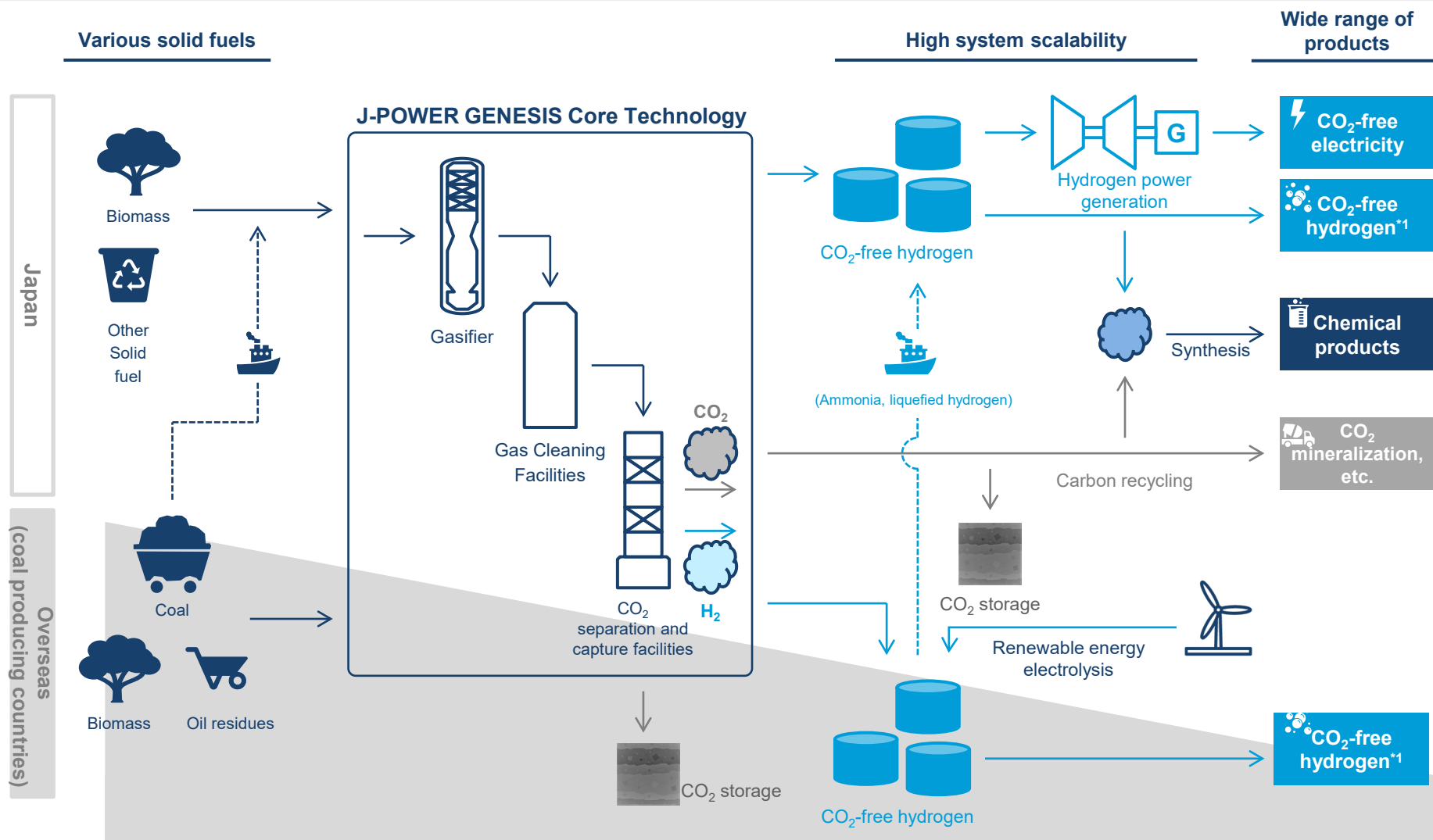
J-POWER “BLUE MISSION 2050” Roadmap



*1 Compared to the actual emissions in FY2013.

*2 The power network enhancement is an initiative of J-POWER Transmission Network.

J-POWER GENESIS Vision Overall Concept



J-POWER GENESIS

Gasification ENERgy & Sustainable Integrated System

*Trademark registered

*1: CO₂-free hydrogen including CO₂-free ammonia is a "sector-coupled energy" usable in various sectors such as industry and transportation.

Features of EAGLE Oxygen-blown Coal Gasification Technology: Development History



GENESIS
Matsushima
Commercial
Plant



Osaki Coolgen
Demonstration Plant
(1,180t/d / from 2016 / Osaki)
⇒ Ready to commercialization



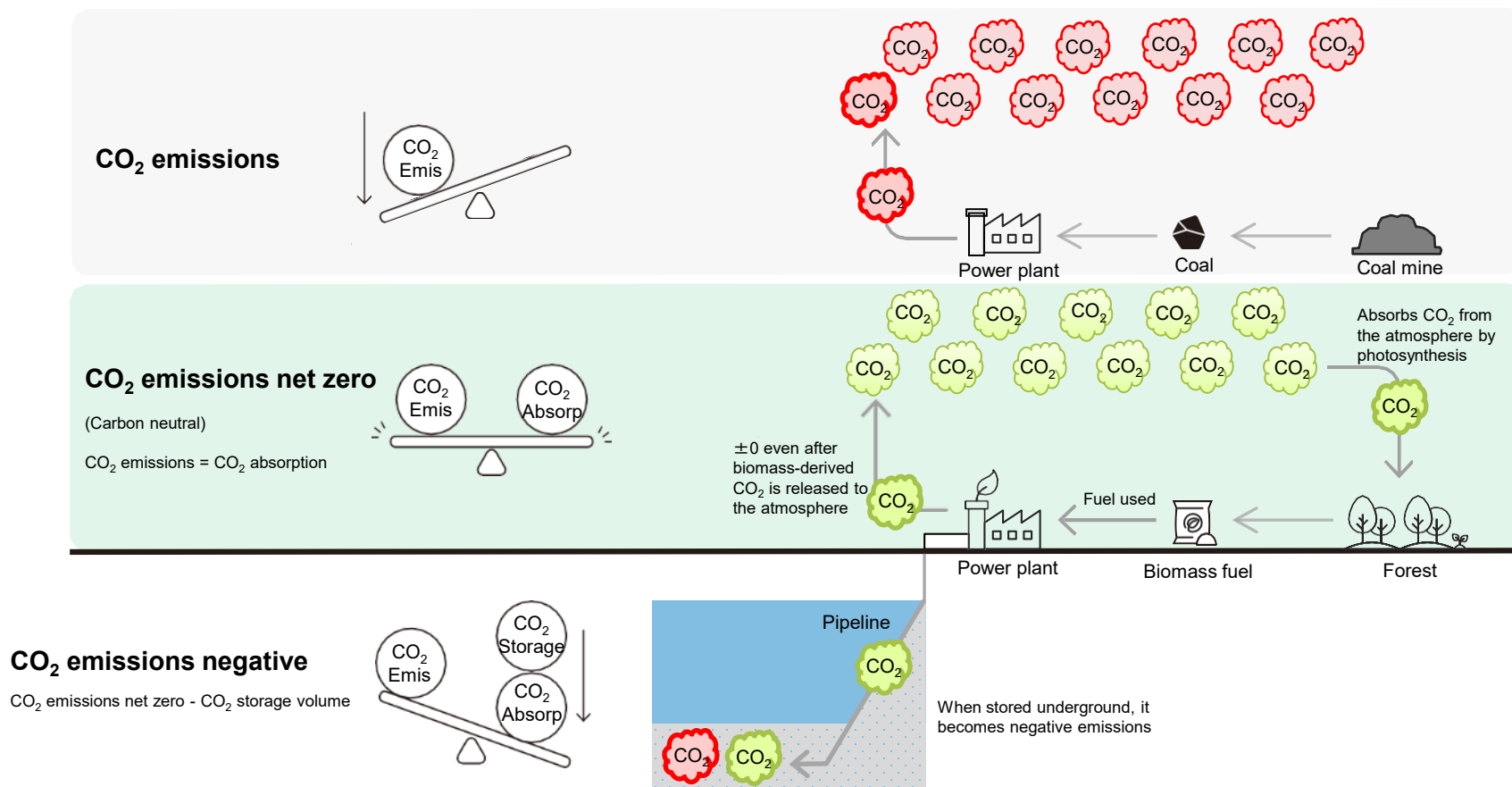
EAGLE Pilot Plant
(150t/d / 2002 to 2013 / Wakamatsu)
⇒ Basic EAGLE Design verified and established

HYCOL Pilot Plant
(50t/d / 1991 to 1993 / Sodegaura)

Process Development Unit
(0.5t/d / 1981 to 1985 / Katsuta)

Latest topics at Osaki Coolgen

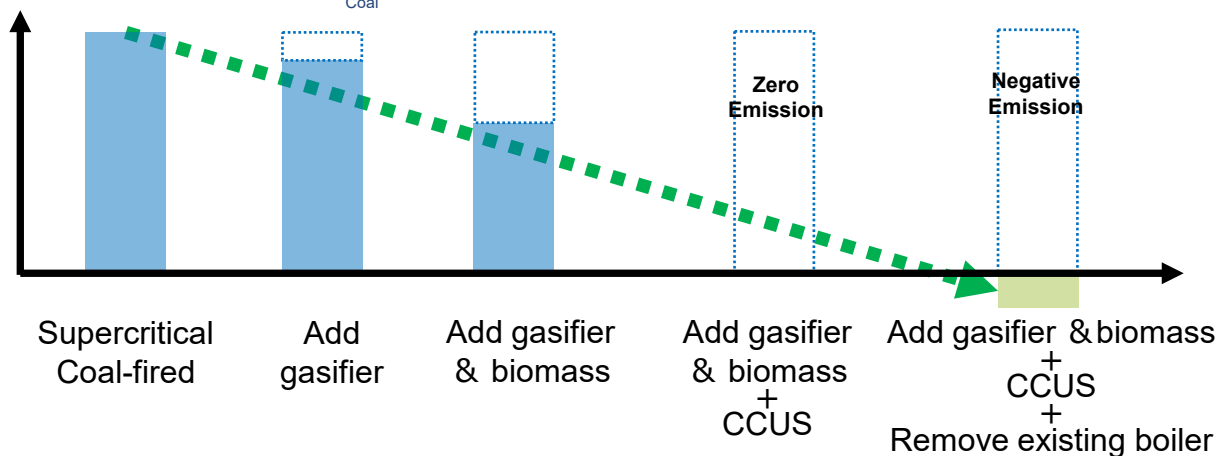
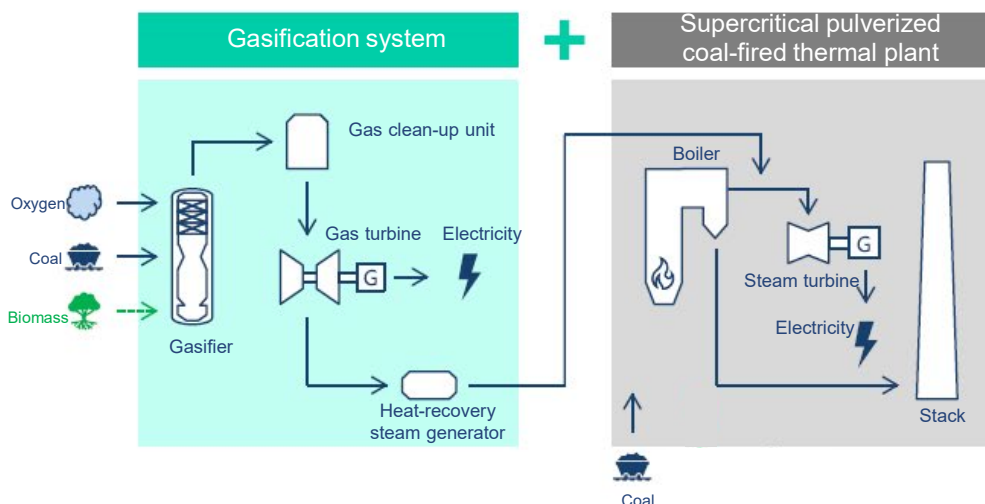
- In the full-scale demonstration test of the Coal/Biomass mixed gasification up to 50% has been achieved.
- Then “Negative Emission(BECCS)” will be achieved in combination with CCS.
- For commercialization, demonstration test which improve the load adjustment capability of so-called “Hydrogen extracted Type GTCC” has been conducted.



Outline of GENESIS Matsushima Commercialization Plan

- J-POWER will take the first step in CO₂-free hydrogen power generation at our Matsushima plant, which pioneered the use of imported coal after the oil crisis.
- Existing J-POWER's Matsushima Thermal power plant will be upcycled while adding gasification equipment.
- By applying new technology to our existing assets, J-POWER aims for early reduction of its environmental impact, with economic rationality, while maintaining a stable power supply.

First step toward CO₂-free hydrogen power generation



Key issues in advancing the Transition to Carbon Neutrality

[Energy portfolio]

- While the significant costs spent for measures and solutions against the impact on power networks accompanying the introduction of extensive variable renewable energy become an issue, aren't there limitations to the one-track strategy which greatly depends on renewable energy?
- To solve this issue, it may be necessary to diversify the supply energy source.

[True Energy Transition]

- While recognizing that we are in a carbon-neutral transition period under the “Hydrocarbon World”, it may be necessary to consider energy transition in the true sense.
- We believe the aspect of the transition could differ depending on what technology is used and when it is realized.

