Webinar for the GIIGNL members

Tokyo Gas's Initiatives related to e-methane

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June 2025

TOKYO GAS GROUP

1. Organization

2. Tokyo Gas’s Initiatives toward Carbon Neutrality

3. Oveview of e-methane and RNG initiatives

4. Overseas e-methane supply chain

Tokyo Gas Group (as of April 1, 2025)

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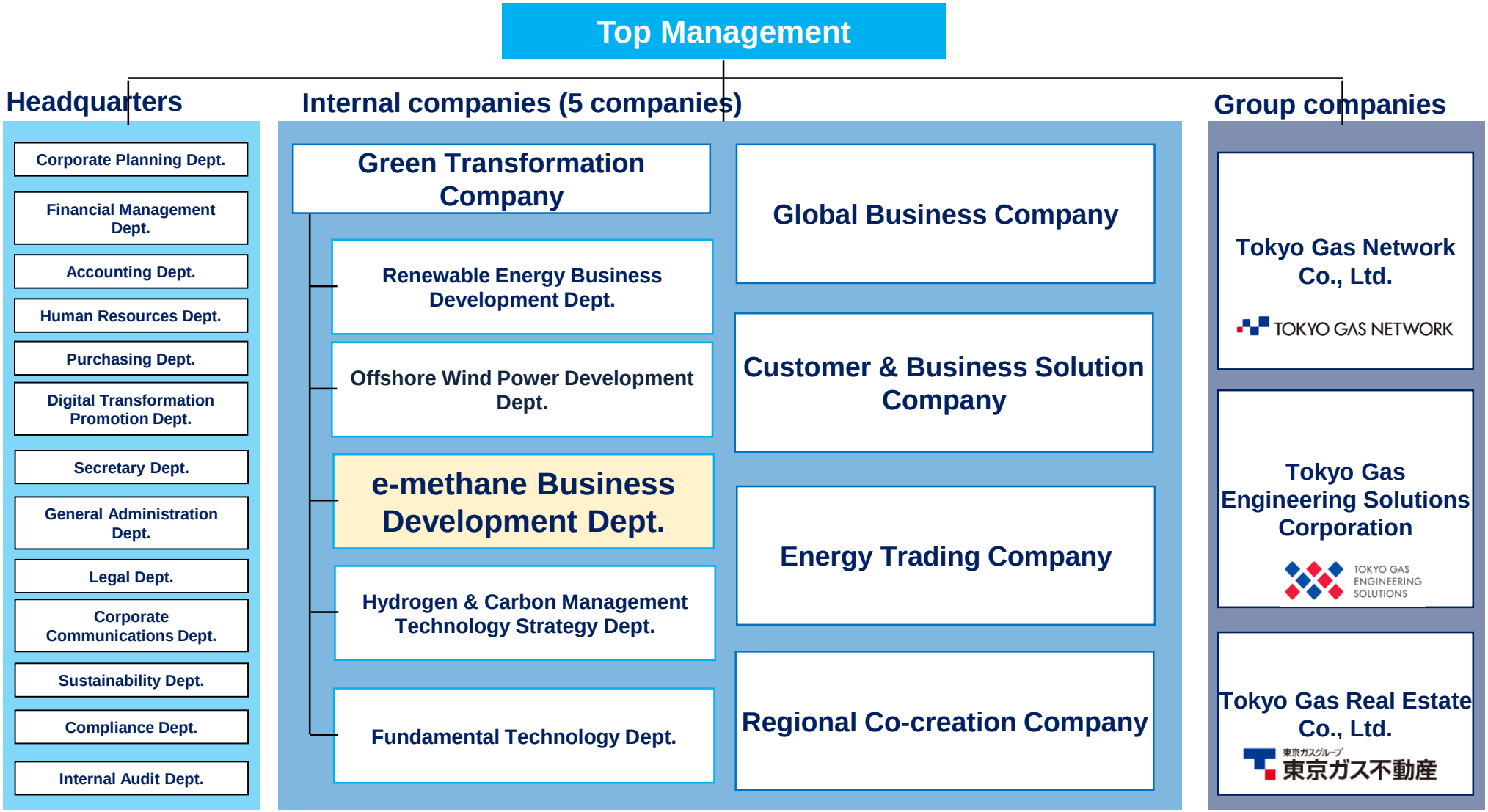
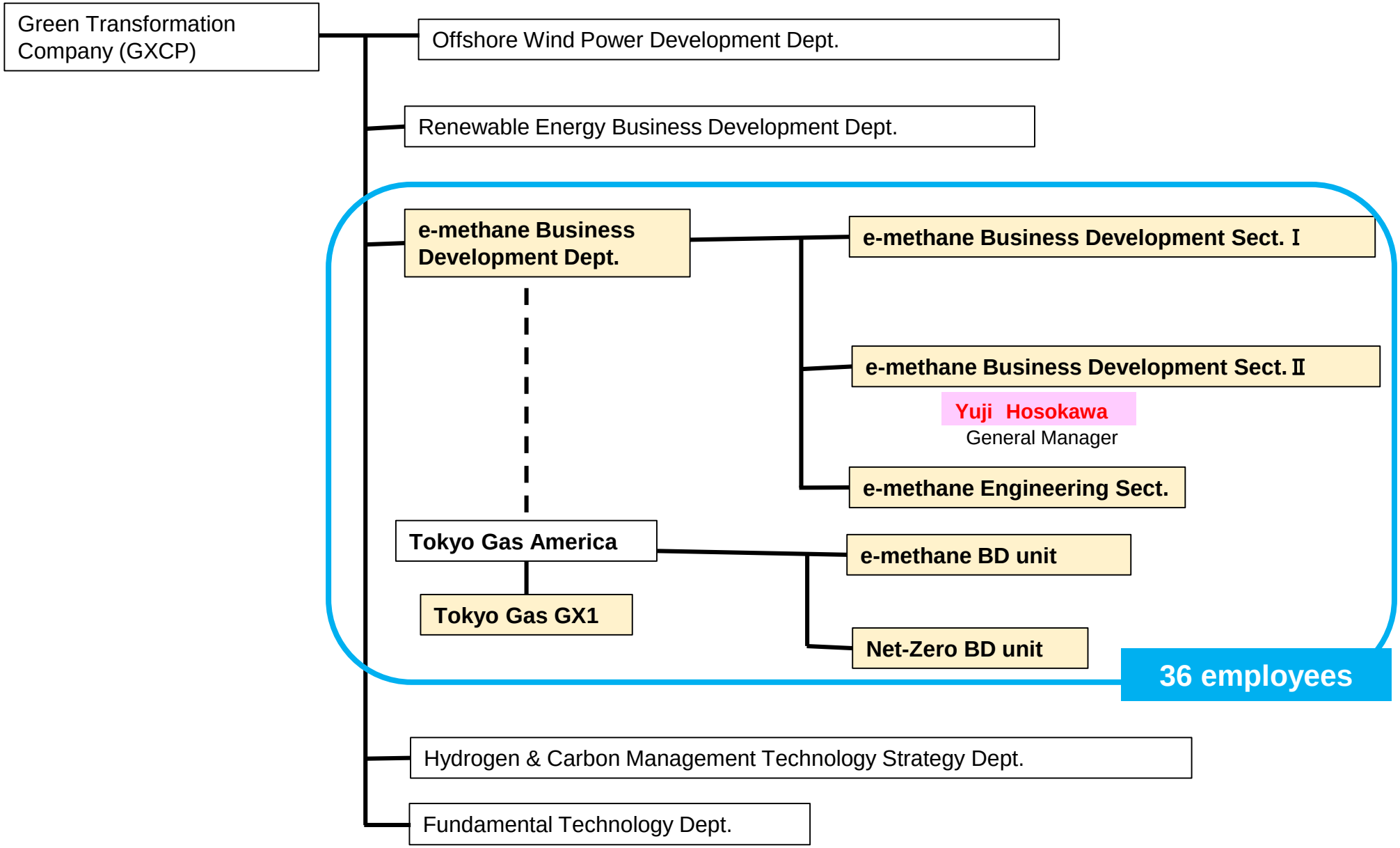


e-methane Business Development Dept. (as of April 1, 2025)



Self-Introduction

1995 - Joined Tokyo Gas as a pipeline engineer

2015 - 2019 (Brisbane) 8.5MTPA LNG project in Queensland, Australia

2019 - 2022 (Houston) 750MW Renewables project (wind and solar) in Mexico

2023 (Houston) e-methane project in the US

2024 - (Tokyo) e-methane projects in Australia and Malaysia

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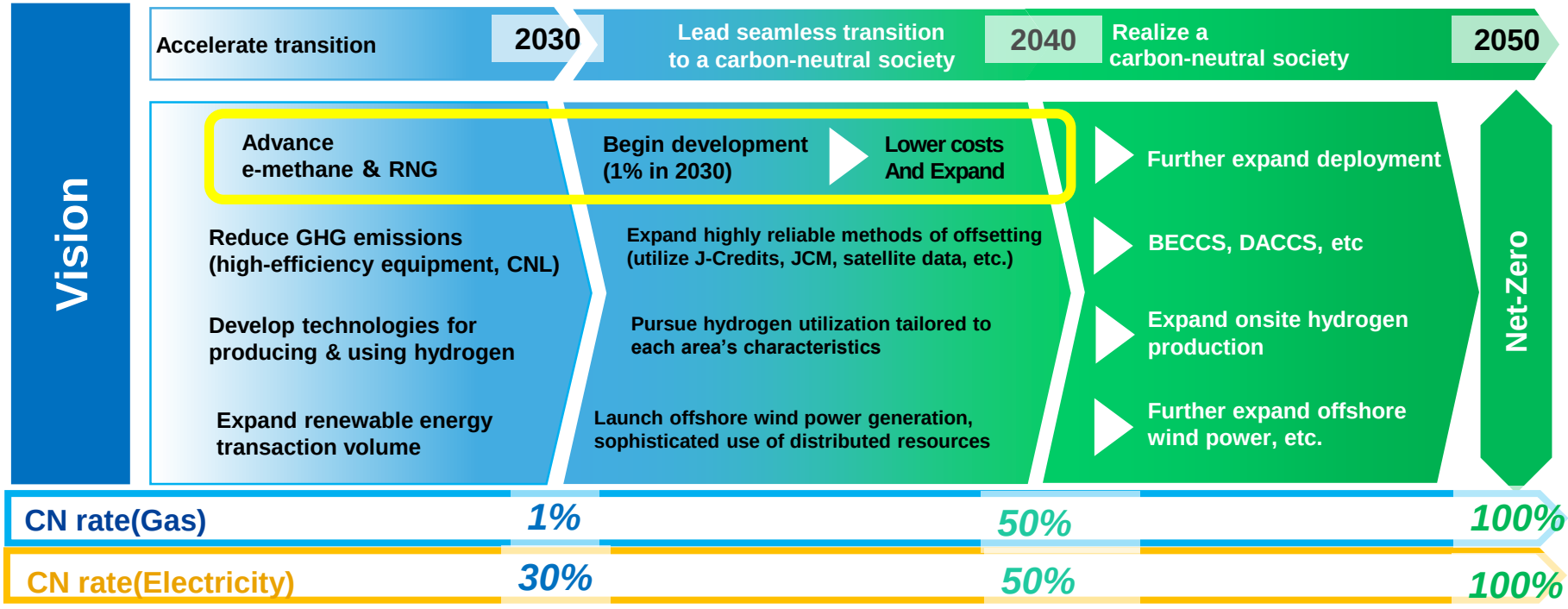
Tokyo Gas's effort toward Net-Zero Society

2030s Implement and Expand Gas and Electricity Decarbonization
2040s Increase Carbon Neutrality Rate to 50%
2050 Achieving Net-Zero

Tokyo Gas Group Carbon Neutrality Roadmap 2050



<Ref.> Position of e-methane in the IEA Gas Market Report

The importance of e-methane is mentioned in the Gas Market Report issued by the IEA.

- ✓ In the report, **e-methane is classified as a low-emissions gas**, and is said to **play an important role in decarbonizing gas supply chains and the broader energy system.**
- ✓ **The latest progress on e-methane** is also mentioned. (Japanese and US companies' LOIs for avoiding CO2 double counting, establishment of an international initiative, etc.)

Position of e-methane in the report

Demand creation will be key for the scale-up of low-emissions gases

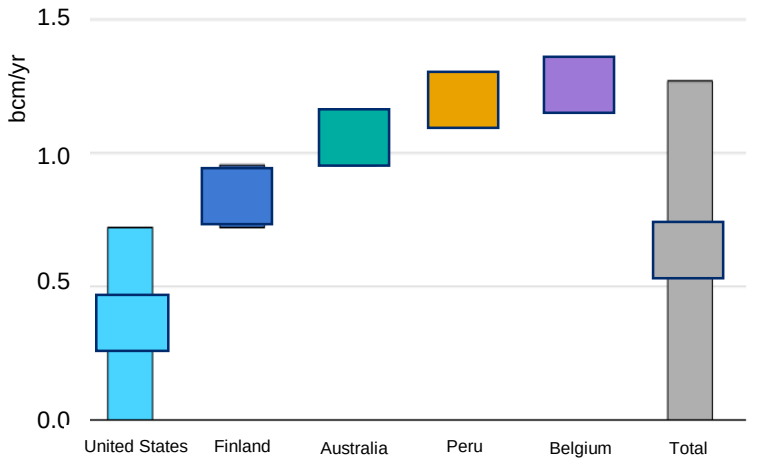
Low-emissions gases (including biomethane, low-emissions hydrogen[3] and e-methane[4]) can play a crucial role in decarbonising gas supply chains and the broader energy system. Recognising their growing importance, the International Energy Agency has developed a Low-emissions Gases Work Programme to track market developments in this area and facilitate dialogue between emerging producers and consumers.

obligation. In the European
biomethane production and
National Energy and Climate

In the case of low-emissions
and demand targets is incre
with low-emissions hydroge
development. As highlighted

(Gas Market Report,Q2-2024, P40)

Global e-methane Potential Volume by 2030



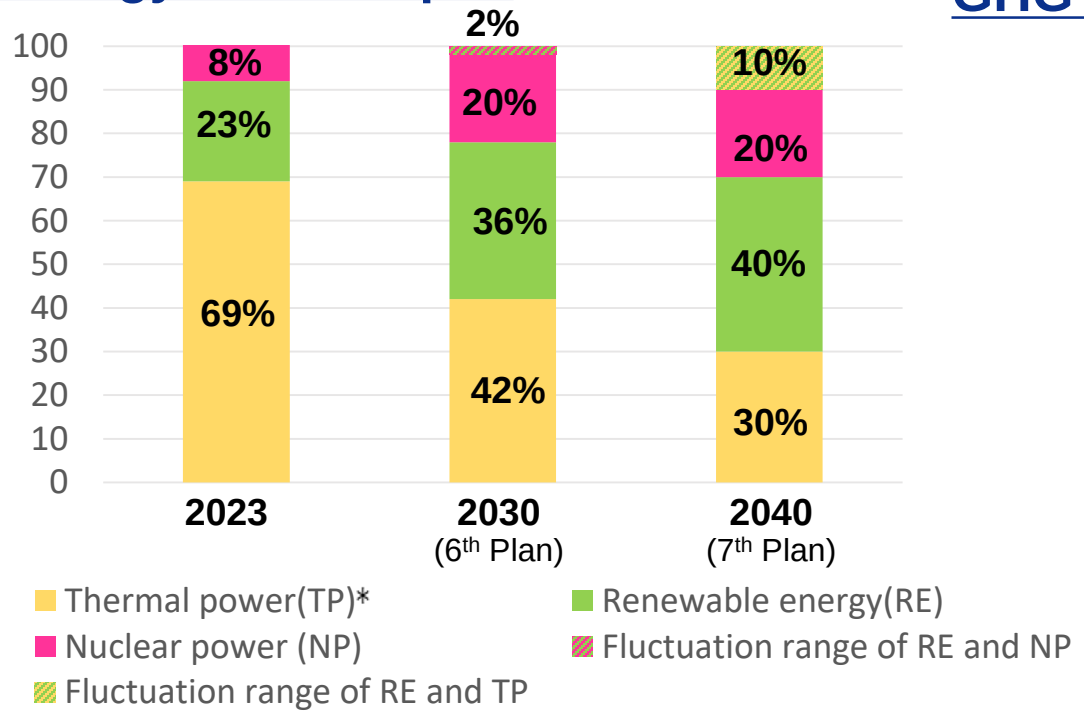
(Gas Market Report,Q3-2024, P54)

<Ref.> Japan's "Seventh Basic Energy Plan"

On Feb 18, 2025, the 7th Basic Energy Plan was approved by the Cabinet. It states that**, while maintaining the principle of S+3E, the basic premise plan is** to ensure **a stable energy supply with safety as the first priority, and to improve economic efficiency and environmental compatibility**.

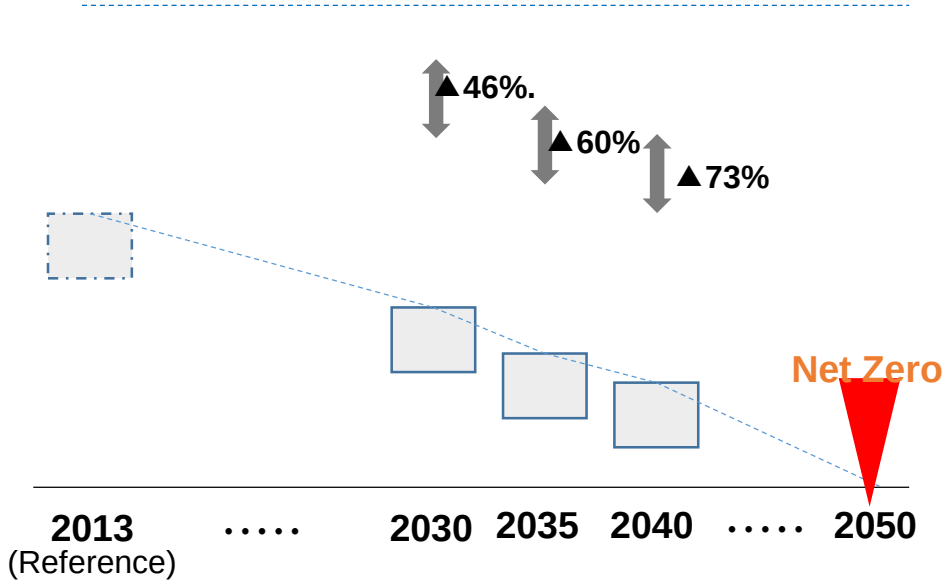
- ✓ **Synthetic methane is expected to be used in a wide range of fields**, and the government will work to improve its competitiveness through technological development and promote capital investment in anticipation of global market expansion. The government will also promote the introduction of biofuels.
- ✓ **In 2030, synthetic methane or biogas equivalent to 1% of supply volume will be injected into pipelines**, and by combining various means, carbon neutrality of city gas will be achieved in 2050.

Energy Mix in Japan



*Including e-methane, Hydrogen, Ammonia etc.

GHG Emission Reduction Targets in Japan



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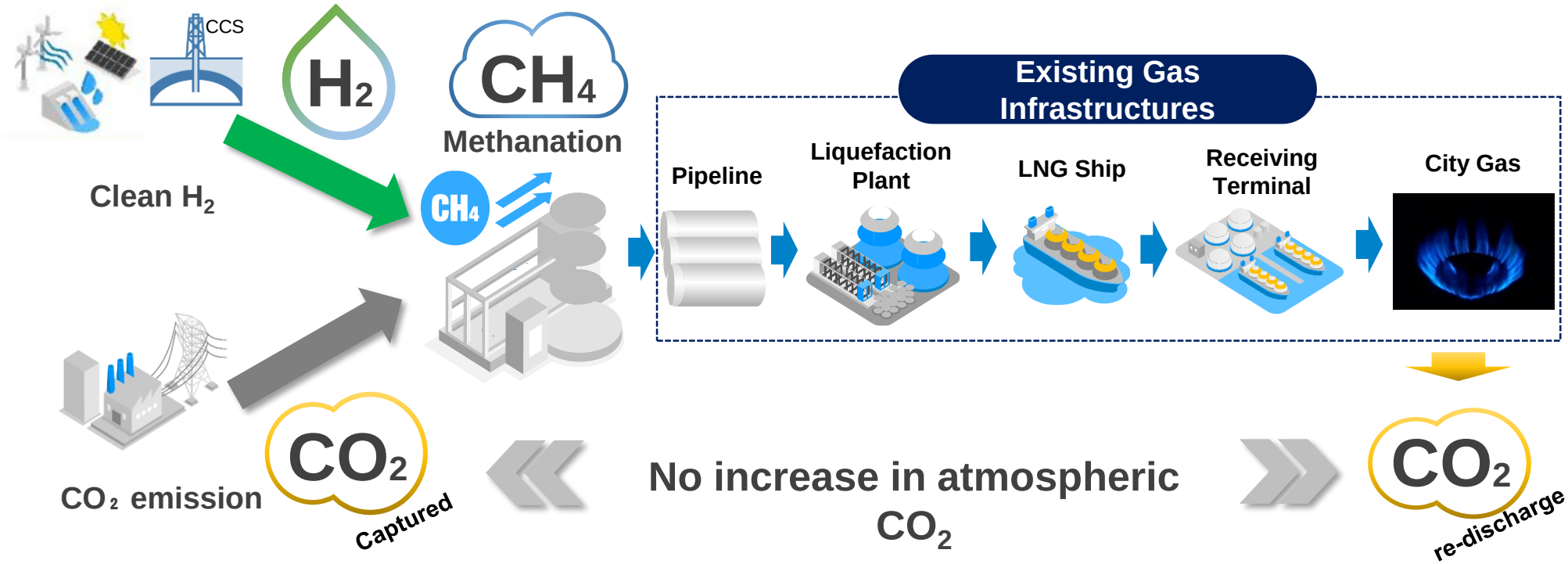
What is e-methane?

- E-methane (e-Natural Gas) is synthesized methane from clean hydrogen and captured CO_2.
- Contribute to reduce CO_2 emission and carbon-neutral by replacing natural gas.
- The existing gas infrastructures can be fully utilized to transport e-methane to customers.



Technology agnostic

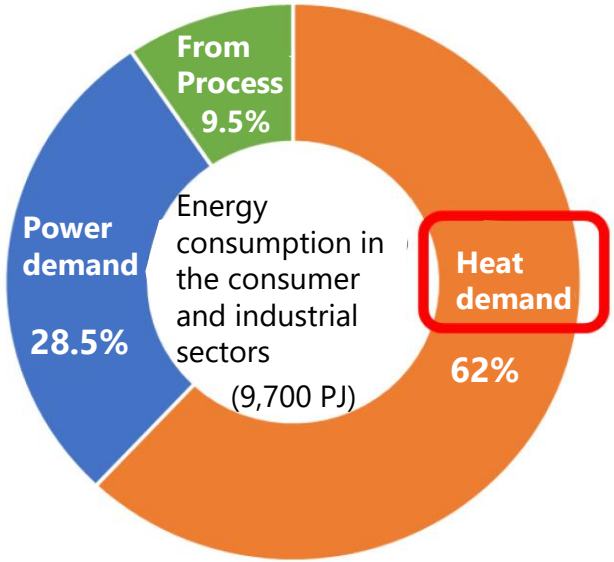
Carbon Intensity < 49.3 g-CO_2/MJ

Why e-methane?

- E-methane plays a key role towards carbon neutrality.
  Decarbonize thermal demand which accounts for 60% of the energy consumed in Japan.
  Utilize existing gas infrastructure saving enormous replacing/ modification cost.
  Scalable solution for LNG exporting and importing countries including Asia and Europe.
  E-methane recognized in key international forums*.

  *G7 Climate, Energy and Environment Ministers' Communiqué on April 15-16, 2023.
  *Japan-U.S. Energy Security Dialogue on December 12, 2024

Energy Consumption by Sectors in Japan



Source: Presented by METI at Basic Policy Subsection Meeting

Utilize Existing Gas Infrastructure

(cost saving & prevention of stranded assets)

- **35 of LNG import terminals** in JPN

- **Over 270k km of existing gas pipeline** in JPN
  *Replacement cost for H2 PL JPY 20 trillion

- **Approx. 600 LNG vessels** (Global)

- **27mil of user's gas appliances** in JPN

Technology Development Initiatives

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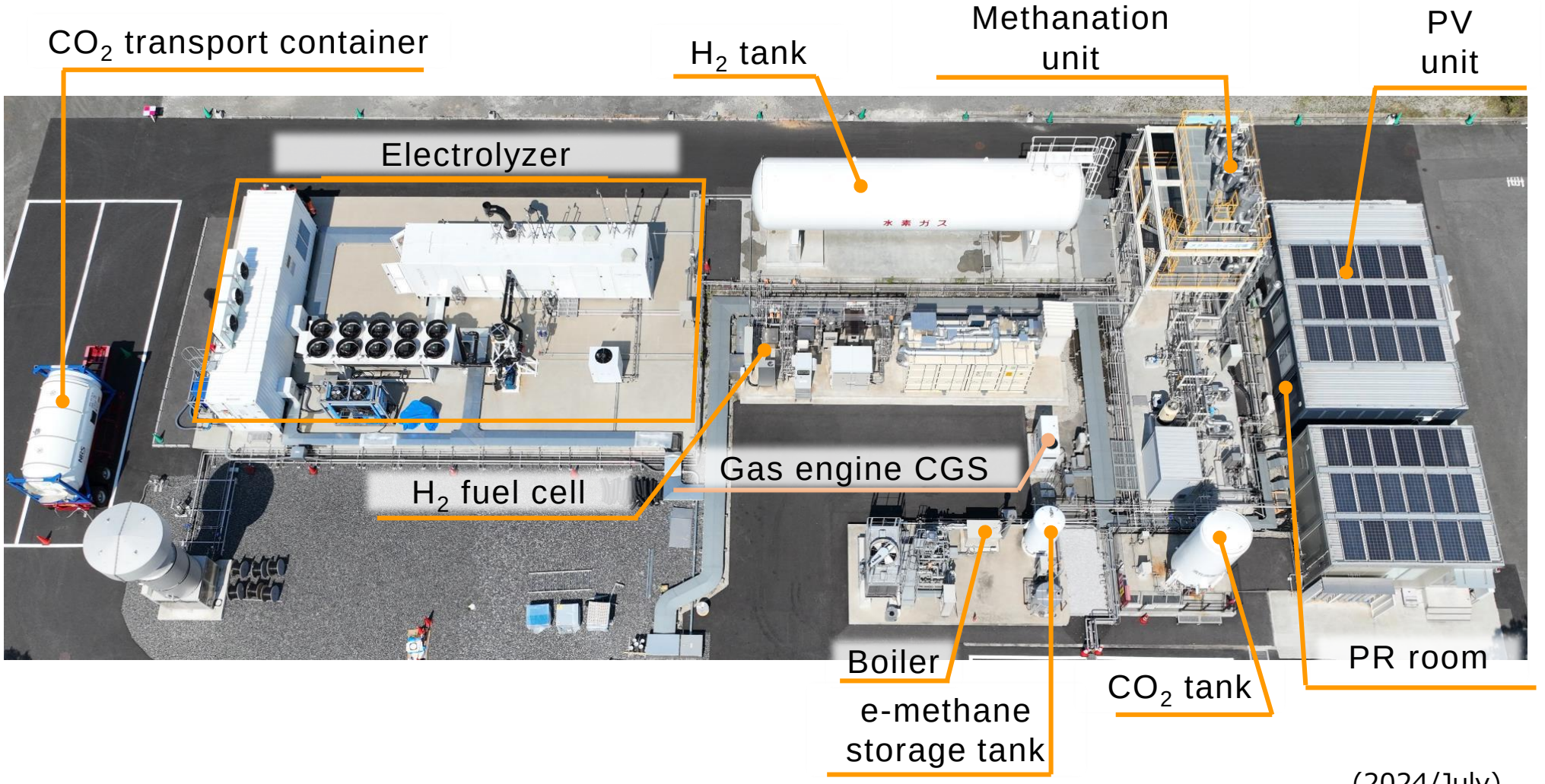
- TG is promoting the development of methanation technology in preparation for the social implementation of e-methane.



(2024/July)

Overview of the Demonstration Area in Tokyo Gas's Techno Station (2022~)

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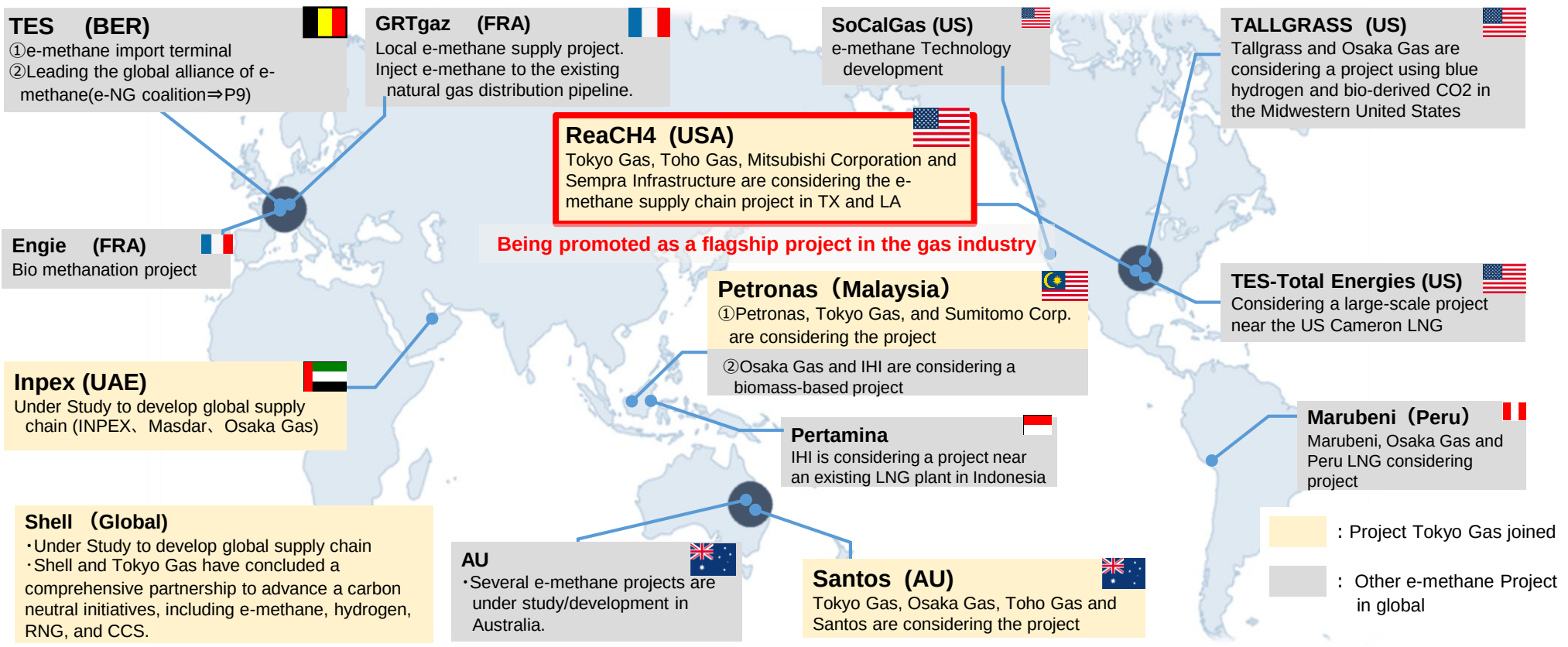
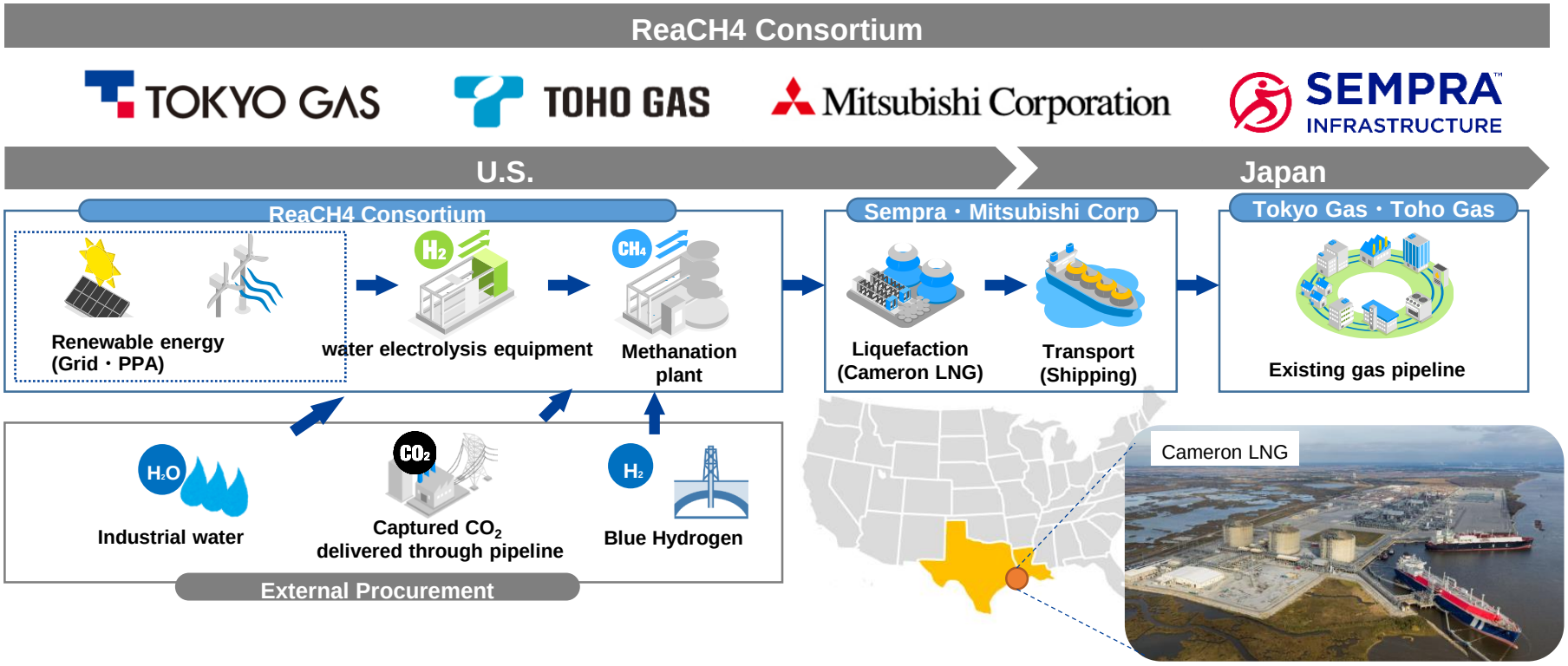
Global e-methane projects under development

- **E-methane initiatives are gradually expanding globally**, with an increasing number of players beginning to consider large-scale e-methane production mainly in the United States, Australia, and Malaysia.
- In addition to exports to Japan, it has also begun to consider exports to Europe and meeting local demand.



ReaCH4 Project (USA)

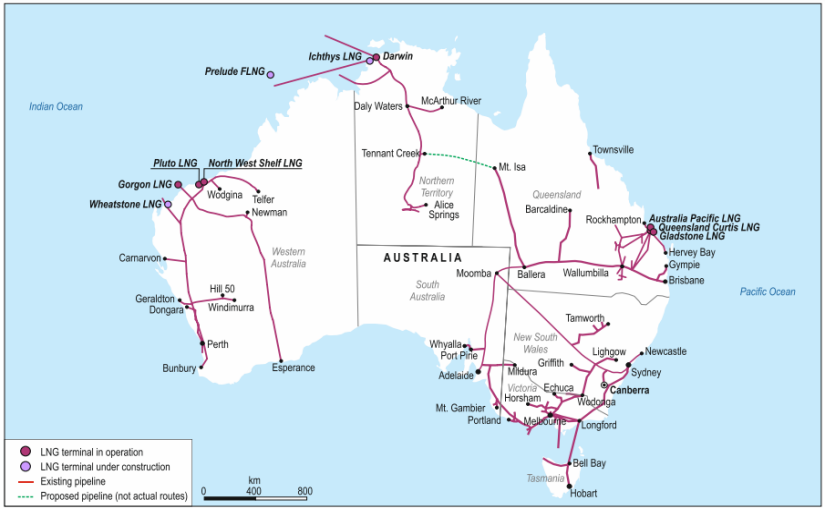
- **The flagship project** to develop world's first commercial scale e-methane supply chain promoted by 4 JP/US companies.
- **Location in TX/LA** in proximity to Cameron LNG plant to utilize existing LNG infrastructures.
- **Contributing to the smooth decarbonization** of heat demand for Tokyo Gas and Toho Gas customers.



Australia

- Pre-FEED study for a large-scale e-methane project in Moomba in east-central Australia is being undertaken in collaboration with Santos, an Australian energy company, Osaka Gas, and Toho gas to produce e-methane and export it to Japan.

Study site - "Moomba"



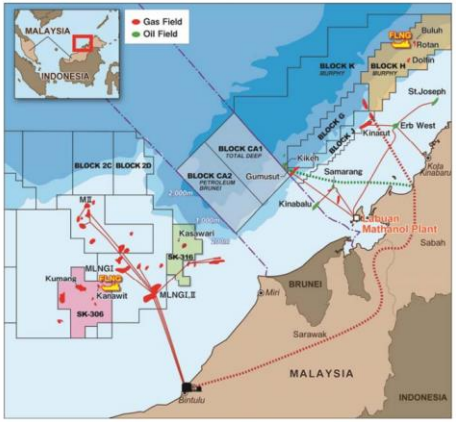
Natural gas pipeline network (red line)

Source: Santos Ltd / ENERGY POLICIES OF IEA COUNTRIES Australia 2018 Review, IEA / Australian Department of Climate Change, Energy, Environment and Water "Australian Energy Update 2022 "

Potential utilization of existing infrastructure, etc.		
Feedstock	Renewable Energy	Abundant resources (solar and onshore wind)
	CO2	Possibly procured from existing emitter in Moomba or transferred from East Coast
	Water	Water resources available in some locations
Transportation	Natural gas pipeline network	Pipeline network to Eastern/Northern Territory of Australia is available
Export	LNG export terminal	To be discussed (GLNG / Darwin LNG)

Malaysia

- **<u>Feasibility Study (FS) for a supply chain development project to produce e-methane from green hydrogen and CO_2 in Malaysia and export it to Japan</u>** has been completed. FS was conducted in collaboration with Petronas, a Malaysian state-owned oil & gas company, and Sumitomo Corporation.
- Preparations for the next phase are underway among the Parties.



Natural gas pipeline network (red line)

Hydroelectric power generation facilities
@photographed during business trip

Malaysia LNG terminal
@photographed during business trip

Potential utilization of existing infrastructure, etc.		
Feedstock	renewable energy	Abundant power generation (hydroelectric)
	CO_2	CO_2 emitted from Malaysia LNG terminal
	water	Abundant water resources
Transportation	natural gas pipeline network	Pipeline connection to Malaysia LNG terminal is required
Export	LNG export terminal	Assuming export from the existing Malaysia LNG terminal

Source: Sarawak Offshore Gas Field Discovery - Malaysia LNG Expansion Strategy, JOGMEC

Global initiative to expand e-methane

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- On October 20, 2024, companies from around the world formed **the world's first international alliance "e-NG Coalition"** aiming to expand e-methane worldwide.
- We are planning to utilize this framework to **raise global awareness of e-methane** and to **implement policy advocacy activities** related to e-methane, including efforts toward global certification and greenhouse gas accounting rules.

Name	e-NG Coalition
Representative	Chairman: Yves Vercammen (TES) Vice Chairman: Yuji Kobayashi (Tokyo Gas)
Purpose	Realization of a CN society through the global expansion of e-methane
Date of Establishment	October 20, 2024 (Brussels, Belgium)
Activity	(1) Raise global awareness of e-methane and encourage market development through regular meetings and the issuance of statements and declarations. (2) In cooperation with all relevant companies and organizations in the e-methane supply chain, carry out policy advocacy activities related to e-methane.
Members (21)	TOKYO GAS, OSAKA GAS Daigas Group, TOHO GAS, Mitsubishi Corporation, IHI, INPEX, K LINE, MOL MitsuiO.S.K.Lines, Italgas, Electrochaea, TES, TotalEnergies, ENGIE, RWE, Shell, StandardCarbon, StormFisher, Terraform Industries, taralta, SAMSUNG E&A, KOGAS


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