July 7, 2021

Launch Methanation Verification Test in FY2021

Tokyo Gas Co., Ltd.

Tokyo Gas Co., Ltd. (President: UCHIDA Takashi; “Tokyo Gas”) will begin the verification test (verification test) for methanation, a city gas decarbonization technology, in fiscal year 2021 to realize carbon neutrality and a decarbonized society in 2050.

Methanation refers to the synthesizing of methane using hydrogen and CO2. It is positioned as one promising technology for the decarbonization of city gas in the future. By producing city gas from synthesized methane, which in turn is derived from CO2-free hydrogen and CO2, the existing city gas infrastructure and devices, which include equipment that uses gas, can be used effectively. This will make it possible to curb additional social costs and concurrently achieve the decarbonization of city gas.

The goal of this verification test is to obtain a series of technologies and knowhow spanning from renewable energy-derived power procurement to synthetic methane production and utilization, grasp the actual values and issues for water electrolysis devices and methanation equipment, and learn about the efficiency of the overall system. Regarding methanation, in addition to corroborating Sabatier, an existing technology, Tokyo Gas plans to collaborate with several institutions to develop innovative technologies, including Hybrid Sabatier aiming for further efficiency, a PEM*1 CO2 reduction technology and bioreactor, which are expected to reduce facilities cost. Going forward, Tokyo Gas will examine a local production for local consumption model for regional carbon neutrality, and corroborate developed technologies. This will contribute to the building of a larger-scale verification test and supply chain at Tokyo Gas LNG terminals.

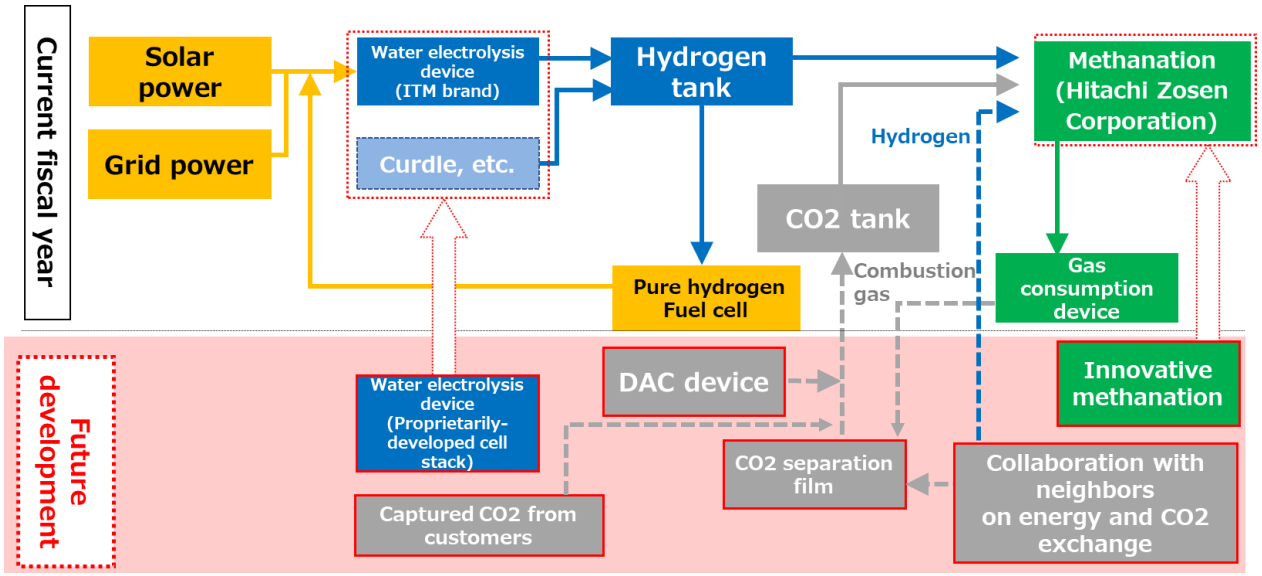
<Overview of this verification test>

Location: Tokyo Gas site at Tsurumi-ku, Yokohama, Kanagawa (about 2100m^2)

Water electrolysis device	・Performance evaluation of the ITM Power PEM water electrolysis device and the acquisition of knowledge for the system configuration of this device ・Performance evaluation and identification of issues for a low-cost electrolysis device that is equipped with a cell stack proprietarily developed by Tokyo Gas
Methanation device	・Performance evaluation (methane production capacity, exhaust heat volume, etc.) and identification of issues of the existing methanation device ・Evaluation of innovative technologies related to methanation

CO2 separation and capture	・Basic research and technology evaluation of new technologies (DAC*2, etc.) related to the separation and capture of CO2
Overall system	・Gain technologies and knowhow on the supply-demand balance from fluctuating renewable energy sources to the manufacturing of synthetic methane, and acquire knowhow on the efficiency (≒feasibility) of the entire system

＜Overview of the Methanation Verification Test Plan＞



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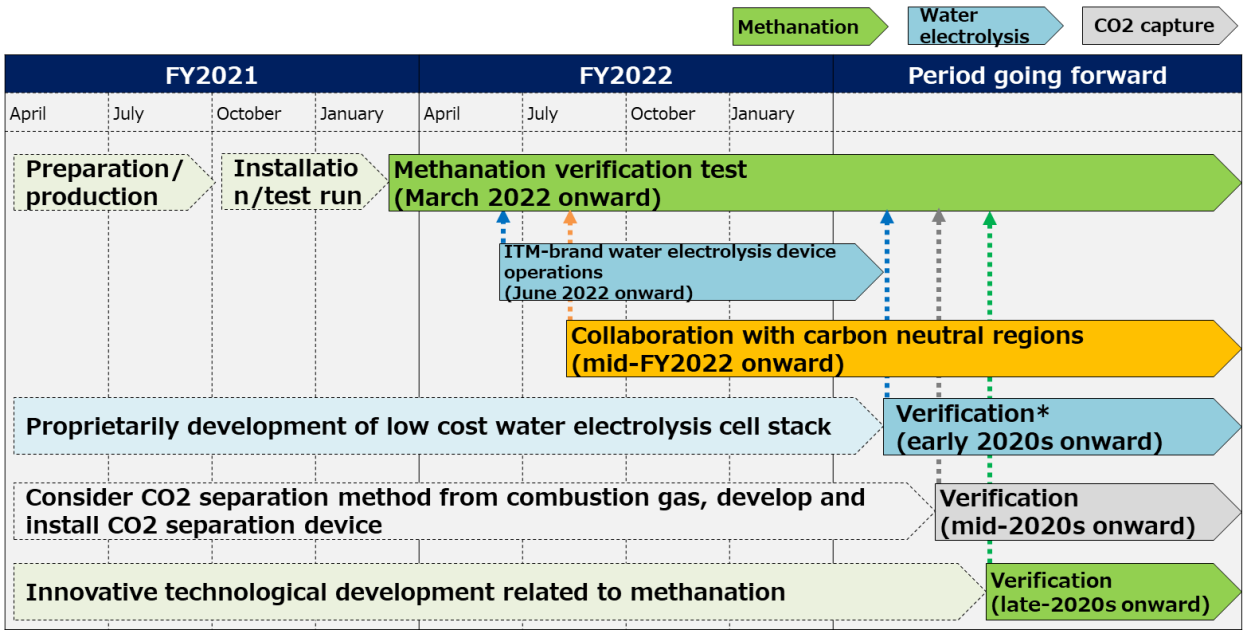

*Verification of water electrolysis device equipped with a cell stack proprietarily developed.

<Innovative technological development related to methanation being undertaken by Tokyo Gas>

Technology		Details
Methanation	Hybrid Sabatier	Establish a low-temperature Sabatier and hybrid water electrolysis technologies
	PEMCO_2 reduction	Establish methane production technology for low reduction voltage
	Bioreactor	Search for bacteria for a high reaction speed and improve efficiency
Low-density CO2 separation and capture		Demonstrate the principle of DAC which uses electrodialysis

In the Tokyo Gas Group Management Vision, Compass2030, Tokyo Gas promotes the challenge of achieving “Net-Zero CO_2” and is working to reduce hydrogen production cost and strengthening the development of CO_2 management technology (CCUS*5). Through this development project, Tokyo Gas aims for the further early realization of technological development aimed at the decarbonization of gaseous energy. By taking the lead in realizing “Net-Zero CO_2”. Tokyo Gas plans to contribute to the government’s scheme to “realize a carbon neutral, decarbonized society in 2050.”

*1 : Polymer Electrolyte Membrane
*2 : Direct Air Capture
*3 : Carbon dioxide Capture, Utilization and Storage

■Water electrolysis device specifications

Model	HGas3SP
Water electrolysis method	Solid polymer type
Hydrogen production capacity	About 30.9kg/hour
Input power	2.0MW
Package	40-foot container Chiller/air blast

■Methanation device specifications

Manufacturer	Hitachi Zosen Corporation
Manufacturing capacity	12.5Nm^3/h-CH_4
Reaction mode	Multi-Shell & Tube type
Methane purity	97%-plus (Maximum: 99.8%)
Heat recovery efficiency	70%-plus
Catalyst life	20,000 hours-plus (In cases where the gas does not contain toxic substances)