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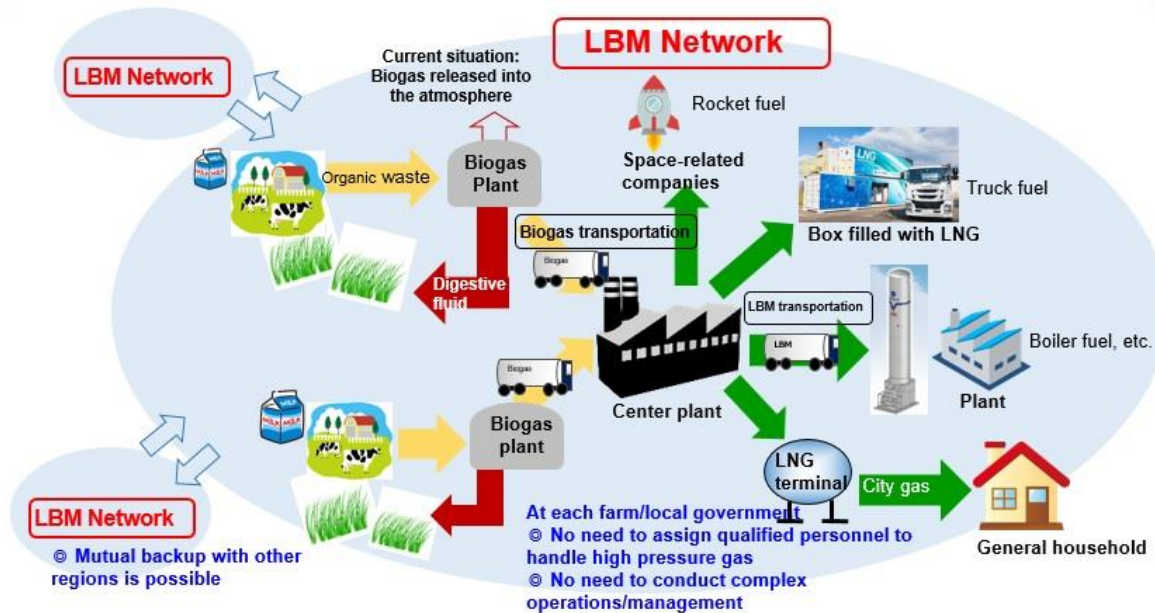
Air Water Inc.

Ministry of the Environment Approves Demonstration Project for “Liquefied Bio-methane”

Local Supply Chain Model Using Unused Biogas

- Commencement of demonstration of a sustainable regional recycling energy supply model in Tokachi-Area, Hokkaido -

Air Water Inc. (hereafter, the "Company") announces the commencement of the construction and demonstration of a model supply chain. The model includes the series of processes from the processing of biogas-derived methane¹ from cattle manure into liquefied bio-methane (LBM)² to its supply to dairies as a substitute fuel replacing liquefied natural gas (LNG).



The Ministry of the Environment approved the demonstration project as a priority in its Low Carbon Technology Research and Development Program. Having distributed LPG and LNG for years, the Company believes in the potential of LBM, a new energy product, in light of the need for the development of a decarbonized society. The Company will move ahead with technological development to quickly enable the use of LBM in society.

¹ What is biogas?

The methane fermentation facilities (biogas plant) operated by cattle farmers and others produce biogas derived from cattle manure that is about 60% methane (CH₄) and about 40% carbon dioxide (CO₂). Cattle farmers use this biogas themselves mainly as a fuel to generate power. They are able to sell extra electricity through a feed-in tariff (FIT) system. However, the system is not efficiently utilized because of the restrictions of power distribution grids and other reasons. The greenhouse effect of methane is about 25 times higher than that of CO₂.

² What is liquefied bio-methane (LBM)?

LBM is made by collecting the biogas extracted using methane fermentation equipment, separating the methane from the carbon dioxide, and liquefying the methane. Liquefaction can reduce the volume the gas occupies and enables gasses to be transported. Because LBM is derived from biogas, which is a renewable energy source, it makes it possible to achieve carbon neutrality. The calorific value of LBM is approximately 90% of the value of general LNG. About 90% of LNG is methane, with the remainder being other hydrocarbons such as ethane, propane, and butane.

1. Outline

This demonstration project will process biogas from cattle manure into LBM, a fuel that can be a substitute for LNG, and will construct a regional recycling supply chain for the production and consumption of energy in the region. The Company will demonstrate that dairies are able to use LBM as a substitute for LNG while collecting and transporting the raw material biogas and manufacturing LBM at a central plant. This is the first time that the manufacturing of LBM using biogas will be attempted in Japan.

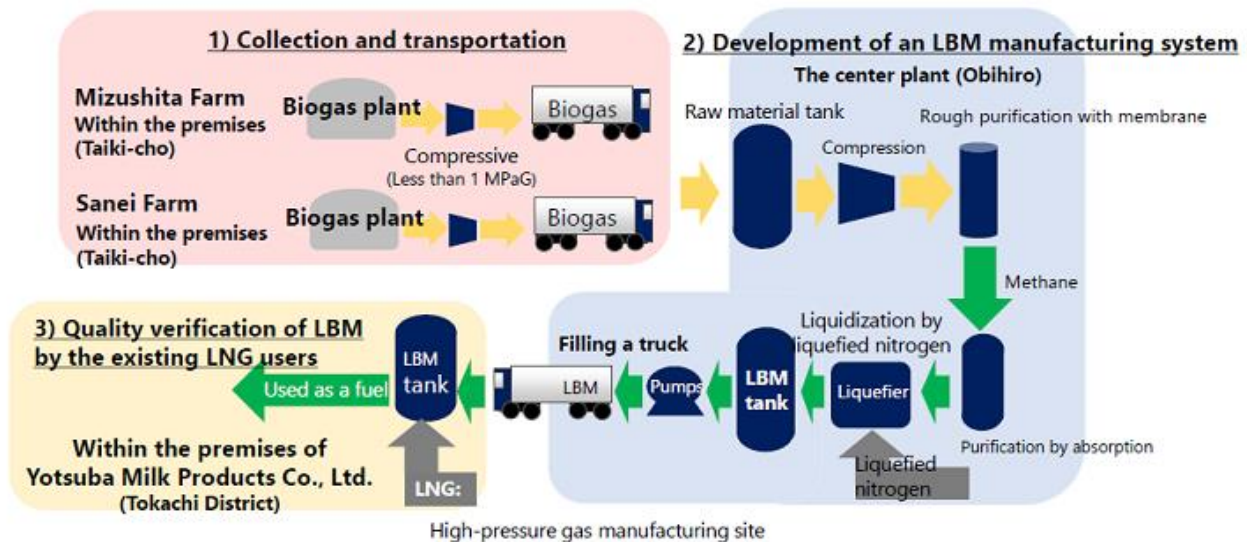
The manufactured LBM will be used as a fuel for LNG trucks, rockets and boilers at nearby plants in the future. Additionally, the Company is discussing the processing and sale of dry ice and other products made from CO₂, a byproduct of the manufacturing of LBM.

In areas where cattle farming is one of the main industries, LBM has the potential to be a domestically produced, sustainable and clean energy. LBM is able to contribute to decarbonization as it can be manufactured and supplied without large-scale capital investment in the supply chain that is currently dependent on overseas imports if the existing LNG infrastructure is used. Accelerating the effective use of biogas and installing more methane fermentation equipment in the region will decrease the odor and water pollution caused by cattle manure.

The manufacturing of energies that are capable of being LNG substitutes from unused regional resources is an effective solution for businesses, city gas companies and cattle farmers, who are all working to reduce their CO₂ emissions. The model can also be applied to convert the biogas from sewage treatment facilities and food waste, so the future expansion of the model nationwide and worldwide is expected.

2.Details of the empirical study

Model supply chain



Cattle-manure-derived biogas is collected and transported from cattle farmers' methane fermentation equipment to a central plant. The plant separates the methane gas that is the main component of biogas and processes it into super-cold LBM through heat exchange using liquefied nitrogen. Then, a tanker truck transports the LBM to a nearby Yotsuba Milk Products Co., Ltd. factory that uses it as an energy source. The central plant for the manufacturing of LBM will be constructed within the premises of the Group's gas filling plant in Obihiro.

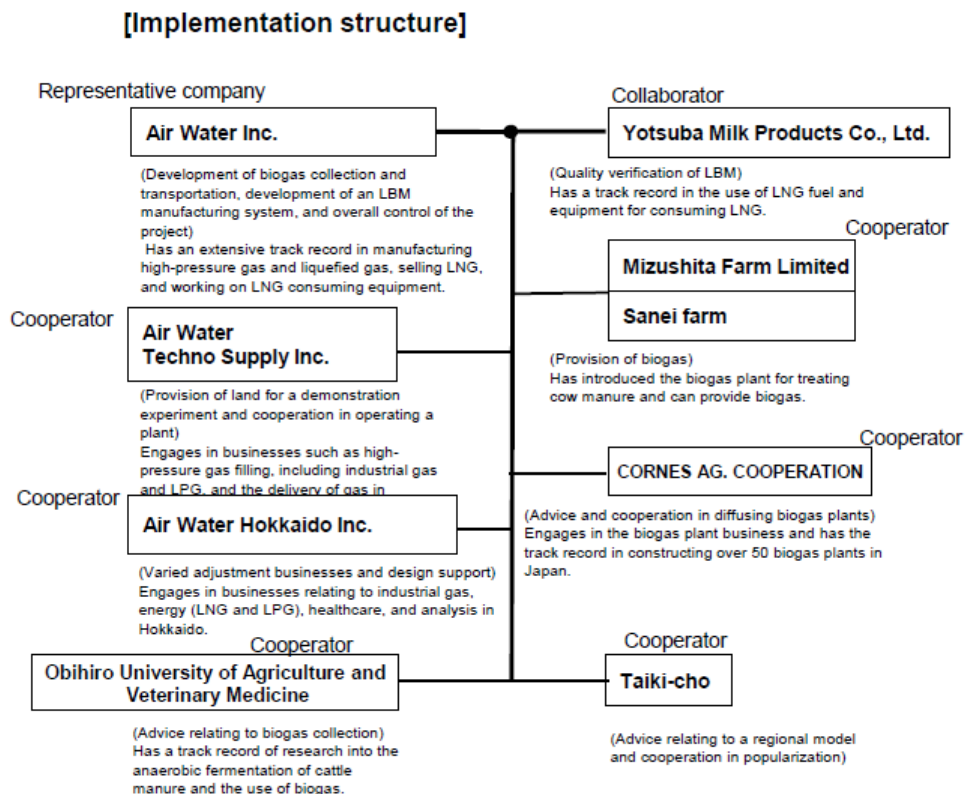
Details of the demonstration project

- ① A system for the collection and transportation of biogas from the methane fermentation equipment of cattle farmers who are widely distributed across the region**
 - Develop a container capable of storing and transporting biogas using a general-purpose adsorbent.
 - Acquire expertise on the sustainable collection and transportation of biogas.
- ② Establishment of technology for the appropriate extraction of the collected biogas and the stable manufacturing of LBM**
 - Utilize the membrane separation technology used in the Hydrogen Energy Supply Chain Demonstration Project from Livestock Manure (Ministry of Environment) in Shikaoi-cho, Hokkaido. Utilize the super-cold gas handling technology relating to industrial gas production for the manufacturing of LBM containing 99% methane.
- ③ Demonstration of quality to show that liquefied bio-methane can be a fuel that is a substitute for LNG**
 - Use a variety of methods to demonstrate quality as there are no precedents for the consumption of LBM as a substitute for LNG.

3. Effects reducing greenhouse gas emissions

The demonstration project is planning to collect biogas from cattle farmers who are not effectively using the biogas generated by their methane fermentation equipment in an area where there is no power distribution grid. The biomass will be used to manufacture 360 tons of bio-methane annually. If all of the bio-methane is consumed as a substitute for LNG, annual CO₂ emissions will be reduced by 7740 tons, and greenhouse gas emissions will be reduced at least 60%.

4. Implementation structure



5. Demonstration project period

Period: Two years from April 2021 to March 2023

Schedule: May 2021: Design and production of device

August 2022: Start of full-scale operations

December 2022: Assessment

(Reference: Background behind the project)

LNG is an energy source with better environmental performance than other fossil fuels. However, our society is becoming more aware of the need to decarbonize the existing LNG supply chain in which LNG produced overseas is imported and consumed. This issue must be addressed in the medium and long term.

Currently, demand for carbon-neutral energy sources is increasing.

In Hokkaido, particularly in areas where cattle farming is a major industry, there is the potential to produce 300,000 tons of bio-methane annually. This production capacity is about 50% of the LNG for industrial use consumed annually in Hokkaido, excluding its use as city gas.³ However, only a limited number of biogas plants have been set up in some parts of the prefecture as the effective use of biogas requires the development of infrastructure including a power distribution grid and gas pipeline networks linked to the equipment. This is a major issue that must be addressed for the utilization of cattle manure and unused biogas.

In light of the current situation, the Company is pushing this project forward with the goal of constructing a novel energy supply model based on local production for local consumption. It will satisfy the needs of both existing LNG consumers who want to effectively use renewable energy and cattle farmers who want to effectively use biogas. In addition to the supply of diverse energy resources, the Group provides LNG-related engineering services nationwide, and has designed and constructed biogas plants and provided consulting services mainly in Hokkaido for years. The application of the Group's knowledge and technology will enable it to commercialize this model as quickly as possible.

³ Calculated on the premise that 5840 dairy farmers keep about 820,000 milk cows in Hokkaido.

(2020 Statistics on Livestock, Ministry of Agriculture, Forestry and Fisheries)

(Reference: the SDGs)

The Group is working toward the achievement of the United Nations Sustainable Development Goals (SDGs) by 2030. The demonstration project addresses the following SDGs.

Goal 7: Affordable and Clean Energy

Goal 9: Industry, Innovation and Infrastructure

Goal 11: Sustainable Cities and Communities

Goal 13: Climate Action



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