[Japan's first project of this kind / Industry-academia-government collaboration with Osaka Metropolitan University and Osaka City] Demonstration of Biogas Production From Waste Bioplastics

Aiming to effectively utilize biomass resources and build a model for local energy production and consumption

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Osaka Gas Co., Ltd.

Osaka Gas Co., Ltd. (Representative Director and President: Masataka Fujiwara; hereinafter "Osaka Gas") together with Osaka Metropolitan University and Osaka City, will begin a demonstration experiment (hereinafter referred to as "this demonstration") in November to collect and disassemble bioplastic lunch containers used at the Morinomiya Campus of the university (hereinafter referred to as the "Morinomiya Campus") and convert them into an energy source for reuse at the Nakahama Sewage Treatment Plant.

The Morinomiya Campus is located in the area to the east of Osaka Castle; in this area, urban development is underway based on the concept of "Innovation Field City that Co-evolves with its University." The Nakahama Sewage Treatment Plant is also located in the area. The decision to undertake this demonstration came up during discussions on ways to collaborate with Osaka City and Osaka Metropolitan University. This will be the first time in Japan that industry, government, and academia have collaborated to demonstrate integrated processes from providing bioplastics to using it as an energy source at a sewage treatment plant.

The use of bioplastics made from renewable, plant-based resources is attracting attention as a way to reduce the use of non-renewable resources, including fossil resources, and to curb greenhouse gas emissions. The Japanese government has announced a plan to increase the amount of bioplastics introduced domestically to two million tons by 2030, which is approximately 30 times the amount in 2018 (70,000 tons).[1] Meanwhile, Osaka Gas is working to further utilize bioplastics discarded after use.

Osaka Gas has been focusing on bioplastics (polylactic acid) since around 2009 and has developed proprietary technology to decompose polylactic acid into lactic acid. Starting in fiscal 2023, the company has conducted field tests[2] using a small test device installed at the Ebie Sewage Treatment Plant in Osaka City. As a result, it was found that adding lactic acid to sewage sludge increases the biogas yield (approximately 60% methane and approximately 40% CO_2) in proportion to the amount added. In addition, compared to sewage sludge alone, the biogas yield of co-digestion of sewage sludge and lactic acid resulted in approximately three times more biogas being produced, and stable operation was also achieved.

In this demonstration, from Tuesday, November 4 to Monday, December 22, boxed lunches using containers manufactured from polylactic acid by Sekisui Kasei Co., Ltd. will be sold at the student cafeteria on the Morinomiya Campus, operated by the Osaka Metropolitan University Co-operative. After being collected on campus, used containers are converted to lactic acid using Osaka Gas's technology and then dumped into a digestion tank at the Nakahama Sewage Treatment Plant adjacent to the Morinomiya Campus. By microorganisms (methanogens, etc.), lactic acid-derived biogas can be obtained in addition to the biogas regularly produced from sewage sludge, and the biogas is used as an energy source within the sewage treatment plant.

Through this demonstration, 60 m^3 of biogas (equivalent to the daily city gas consumption of approximately 30 average households) will be obtained from collected bioplastics. In addition, it is expected that the use of petroleum-based plastics will be reduced by approximately 60 kg, which will result in a reduction in CO_2 emissions of approximately 340 kg.

It is estimated that the amount of bioplastics that can be converted to biogas, circulating in the Kansai region in the future, will be approximately 30,000 tons per year[1, 3] (if all of it were converted to biogas, this would be 32 million m^3, equivalent to the annual city gas consumption of approximately 40,000 average households). Osaka Gas will gradually scale up its bioplastic biogasification technology, aiming to put it into practical use at sewage treatment plants around 2030.

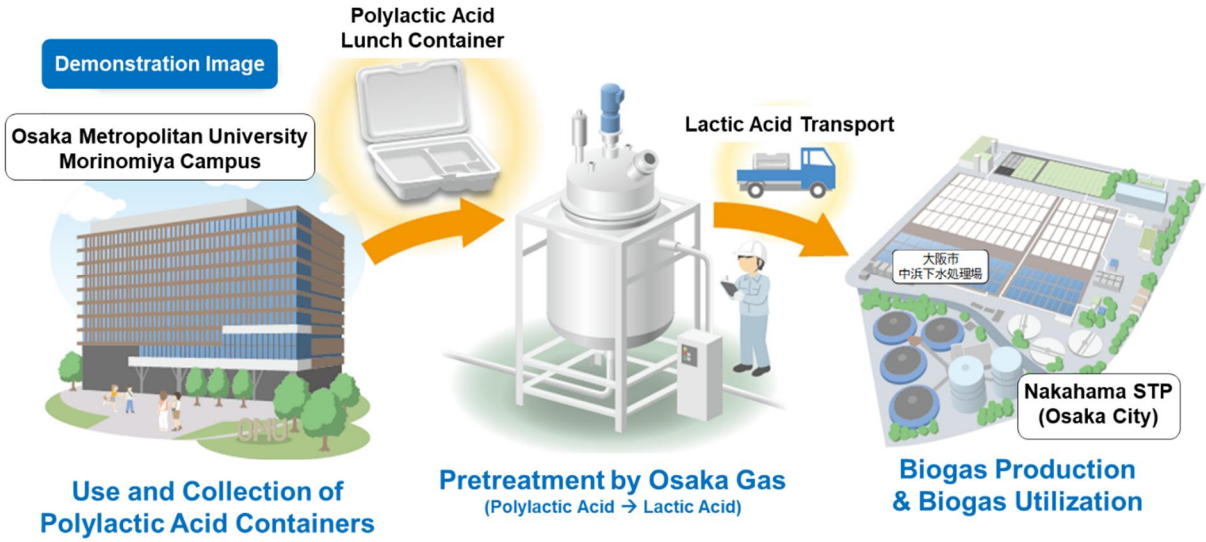
The company is also working in parallel on the development of biomethanation technology, which uses microorganisms to react the CO_2 and hydrogen contained in biogas to synthesize methane. The company hopes to make effective use of locally produced, unused biomass resources and help create a circular economy and build a model for local energy production and consumption.

The Daigas Group, under the Energy Transition 2050 initiative announced this February, remains committed to developing technologies and services that contribute to realizing a carbon-neutral society and solving social issues, including climate change, in order to become a corporate group that contributes to the *further evolution* of customers' lives and businesses.

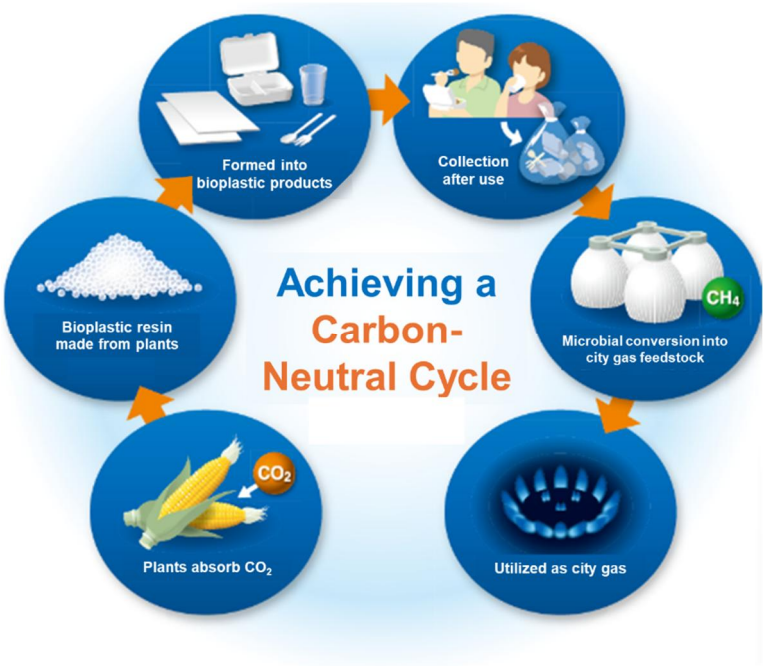
1: Roadmap for Bioplastics Introduction
https://www.env.go.jp/recycle/mat21030210_1.pdf

2: Conducted jointly with Kyoto University, NJS Co., Ltd., and the municipal government of Osaka under the Ministry of Land, Infrastructure, Transport and Tourism's FY2022 Sewage Application Research.
https://www.osakagas.co.jp/company/press/pr2022/1305412_49634.html

3: Population estimates (as of October 1, 2024)
https://www.stat.go.jp/english/data/jinsui/2024np/index.html



Demonstration flow



Osaka Gas's vision for bioplastic recycling