



New Waste-to-Ethanol Facility in Japan Turns Municipal Solid Waste into Products

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Sekisui Chemical Co., Ltd. and INCJ, Ltd. today announced the completion of a waste-to-ethanol demonstration plant in Kuji City, Iwate, Japan. This plant represents a significant opportunity for creating sustainable feedstocks used in the manufacture of other products from waste materials while changing how municipalities address municipal solid waste (MSW) issues within their communities.

This first of its kind demonstration facility is approximately 1/10th the size of a commercial scale facility and will produce approximately 20 tons per day of ethanol from municipal waste sourced from Kuji City. The aim is to achieve commercialization by around 2025, and to start supplying bio-refinery (BR) ethanol to the market by implementing the first commercial scale plant in Japan.

There is sufficient carbon locked away in municipal waste to enable local production of everything needed in one's daily life. According to The World Bank, "With rapid population growth and urbanization, annual [global] waste generation is expected to increase by 70% from 2016 levels to 3.40 billion tons by 2050." Approximately 60 million tons of combustible waste are generated each year in Japan; this demonstration facility will help solve the municipal waste challenges faced in both Japan and the rest of the world.

Leveraging joint technology by LanzaTech NZ, Inc. and Sekisui Chemical Co., Ltd., municipal solid and industrial waste can be converted into ethanol using a microbial catalyst and gas fermentation process. This technology has the opportunity to reduce waste and create an alternative, closed loop carbon supply chain. Using waste gases that would otherwise be combusted and emitted as CO₂ and pollutants, the process offers more than just greenhouse gas (GHG) reductions: it can reduce local air pollutants such as particulate and NO_x emissions by 80% or more. When converting MSW, the process avoids the need to landfill or incinerate unsorted, unrecyclable waste streams, avoiding both methane and CO₂ emissions in the process.

The Kuji Plant builds upon the successful 2017 demonstration by LanzaTech and Sekisui Chemical Co. of the conversion of MSW-derived syngas to ethanol at pilot scale, outside of Tokyo, Japan. The syngas stream was produced by an existing commercial-scale gasification plant using unsorted MSW and showed that it is possible to recycle the carbon from unsorted MSW destined for landfill or incineration and ferment it to make new products that would otherwise come from fossil resources or sugars. The plant achieved continuous ethanol production above design capacity, despite highly unstable and fluctuating syngas compositions and high levels of gas contaminants.

In 2020, Sekisui Chemical Co. and INCJ, Ltd. established a joint venture (JV) called Sekisui Bio-Refinery Co. Ltd. (SBR) to verify and commercialize technology to convert combustible waste into ethanol using the microbial catalyst system jointly developed by Sekisui Chemical and LanzaTech.

The waste-to-ethanol plant was funded with investment by SBR, a joint venture between Sekisui Chemical and INJC, a private-public fund overseen by the Japanese Ministry of Economic, Trade, and Industry (METI). It has also received funding from the Japanese Ministry of the Environment.

"Through great collaboration with stakeholders, including the Prefecture of Iwate and the City of Kuji, we were able to complete this demonstration plant on schedule, despite the continuing COVID-19 pandemic," said SBR President and Representative Director Toru Ryoso. "Going forward, we will collaborate with partners and stakeholders in continued technological demonstration and studies for commercialization. We hope to contribute to achieving a sustainable resource-oriented, and low carbon society through the early implementation and commercialization of this Bio-Refinery (BR) ethanol technology."

Sekisui Chemical is collaborating with Sumitomo Chemical Co. Ltd. to build a new loop in which ethanol is converted into ethylene and then into plastic (polyolefin). The goal is to create a new plastic resource recycling system in which the manufacturers of consumer goods use this plastic; the products are then used and disposed of and again returned to the BR plant so that they can be repeatedly recycled. This will require collaboration by many stakeholders, including corporations, local municipalities, and consumers.

The ethanol produced by BR technology is synthetic alcohol (JAAS standard, Japan Alcohol Association) and can be converted into ethylene and then kerosene for use as Sustainable Aviation Fuel (SAF).

"In the aim of achieving a sustainable society, we are engaged in innovation for solving social issues such as decarbonization and resource recycling," said Sekisui Chemical President and Representative Director Keita Kato. "BR ethanol technology that converts waste into resources is an innovative technology that could solve many of these major issues. We hope that it will contribute to creating and passing on, a rich, sustainable society to the next generation. We will continue to promote a wide variety of collaboration and work to commercialize technology that "converts waste into resources."

"LanzaTech is grateful for its partnership with SEKISUI, INCJ, the Prefecture of Iwate and the City of Kuji for their support in ensuring the completion of this demonstration facility," said LanzaTech CEO Dr. Jennifer Holmgren. "We are also grateful to the Government of Japan for its continued support and investment in sustainable technologies. LanzaTech is committed to accelerating the commercialization of waste to ethanol, enabling Japan to meet its carbon needs with local resources. A pollution free future is possible through this collaboration."

**Note we have Japanese versions of this release.*