April 11, 2022

Press Release

SEKISUI CHEMICAL CO., LTD.
INCJ, Ltd.
SEKISUI BIO REFINERY CO., LTD.

1/10th Scale "Waste to Ethanol" Demonstration Plant Completed in Kuji City
– Aiming to Build a New Social System for Resource Recycling –

OSAKA, Japan (April 11, 2022) -- SEKISUI CHEMICAL CO., LTD. (President and Representative Director, Keita Kato; hereinafter, "SEKISUI CHEMICAL"), INCJ, Ltd. (President and COO, Mikihide Katsumata; hereinafter "INCJ"), and SEKISUI BIO REFINERY CO., LTD. (President and Representative Director, Toru Ryoso; hereinafter, "SBR") have completed construction of a demonstration plant in Kuji City, Iwate, Japan with the aim of demonstrating the viability of the technology that converts municipal/industrial waste into ethanol on a commercial scale. This technology uses a microbial catalyst[*1] and gas fermentation process (hereinafter: BR[*2] ethanol technology) that was jointly developed by SEKISUI CHEMICAL and a US Carbon Capture and Transformation "CCT" company, LanzaTech NZ, Inc. (Headquarters: Illinois, U.S.; CEO, Jennifer Holmgren).

＊1 Refer April 16, 2020 press release by SEKISUI CHEMICAL entitled "Establishment of Joint Venture to Commercialize "Waste to Ethanol" Technology".
＊2 BR: Abbreviation for Bio Refinery.

1 . SBR Kuji Demonstration Plant Outline

This first of its kind demonstration plant was constructed with investments from SBR, a joint venture between SEKISUI CHEMICAL and INJC, a private-public fund overseen by the Japanese Ministry of Economy, Trade and Industry (METI). It has also received funding from the Japanese Ministry of the Environment.[*3]

The goal of the SBR Kuji demonstration plant is to assess the technological and commercial viability of

BR ethanol technology from municipal/industrial waste. The parties will use this facility to validate the technology and commerciality of scaling up, system optimization, stable operations, and business feasibility. This demonstration plant is approximately 1/10th the size of a commercial plant, and ethanol will be produced from municipal waste sourced from Kuji City, which will total approximately 20 tons per day. In addition to proving the technical feasibility of this technology, the demonstration plant aims to show the long-term benefits of resource recycling. It will be open to tours by municipalities, waste management companies, and other interested stakeholders to spread awareness of the new technology and its products.

＊3 Project commissioned by Ministry of the Environment: Refer "Project Promoting Construction of a Carbon Recycling Society Model by Converting CO_2 into Resources."

■SBR Kuji Demonstration Plant Outline

Location: No. 9-54-1 Hon-cho, Samuraihamacho, Kuji, Iwate

Area: Approx. 25,000 ㎡ (including green area)

Processing capacity: General disposal (combustible garbage) approx. 20t/day

Production volume: 1 to 2 kL /day

Production technology: Gasification reformer (Mitsubishi Heavy Industries Environmental & Chemical Engineering Co., Ltd.)

Gas refining technology (SEKISUI CHEMICAL)

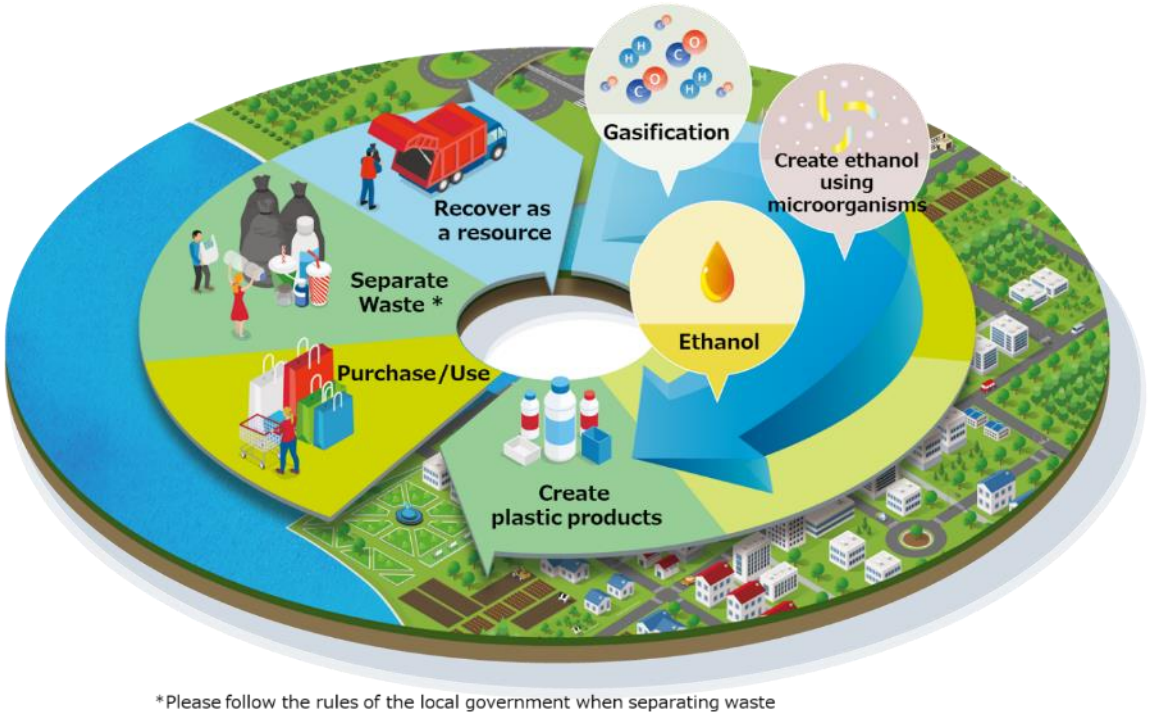
Microbial biocatalyst and Gas Fermentation technology (LanzaTech NZ, Inc.)

Ethanol distillation technology (SEKISUI CHEMICAL)

2. Future Aims of BR Technology Through Verification Project

To achieve the "new social system for resource recycling," SEKISUI CHEMICAL and SBR are aiming to establish a new recycling system to provide new life to municipal/industrial waste by creating fossil-free ethanol that can be used in everyday products.

＜New social system for resource recycling＞



*Please follow the rules of the local government when separating waste

SEKISUI CHEMICAL is collaborating with SUMITOMO CHEMICAL COMPANY, LTD. to build a new closed-loop system in which ethanol is converted into ethylene and then into plastic (polyolefin). The aim is to create a new plastic resource recycling system in which plastic consumer goods are used, disposed of and then returned to the BR plant so that they can be reused in the manufacturing process repeatedly. This will require collaboration by a wide range of participants (corporations, local municipalities, consumers, public authorities etc.). The aim is to extensively promote co-creation for a sustainable, post pollution society.

The BR technology will produce synthetic alcohol (JAAS standard, Japan Alcohol Association). Although this ethanol is not edible, it can be used to create a myriad of end products. For example, the ethanol could be converted into ethylene and then kerosene, for use as Sustainable Aviation Fuel (SAF).

3. Commercialization Schedule

In parallel with testing at the demonstration plant, SBR and SEKISUI CHEMICAL will collaborate with local municipalities and private companies (waste disposal companies etc.) on discussions regarding waste material supply as well as with ethanol users (resource recycling companies etc.). The first commercial-scale facility is targeted to begin production around 2025.

4 . Inauguration Ceremony

An inauguration ceremony was held on April 8, 2022 to commemorate the completion of construction of the Kuji demonstration plant. Regional representatives such as Joji Endo, the Mayor of Kuji City, and several regional council members attended the ceremony. Participants from SEKISUI CHEMICAL included President and Representative Director Keita Kato and Director and Business Strategy Department head, Futoshi Kamiwaki. Participants from INCJ included Chairman and CEO Toshiyuki Shiga and others. Participants from LanzaTech NZ, Inc. included CEO Jennifer Holmgren.

Comments from Representatives

SEKISUI CHEMICAL President and Representative Director Keita Kato:

In the aim of achieving a sustainable society, we are engaged in innovation of technologies aimed at solving social issues such as decarbonization and resource recycling. BR ethanol technology that converts waste into resources is one such 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."

INCJ Chairman and CEO Toshiyuki Shiga:

"INCJ is truly delighted that the Kuji demonstration plant has been smoothly completed through the great efforts of SEKISUI CHEMICAL, SBR and the cooperation of many in the local community," said INCJ Chairman and CEO Toshiyuki Shiga. "This plant is an important first step in the commercialization of technology for converting waste into resources. We hope that this technology will significantly reduce CO_2 produced via the incineration of waste and help resolve the issue of plastic waste disposal. We will collaborate with various stakeholders to achieve practical implementation and commercialization of this technology, which was created through open innovation."

SBR President and Representative Director, Toru Ryoso:

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 BR ethanol technology.

Contact Information

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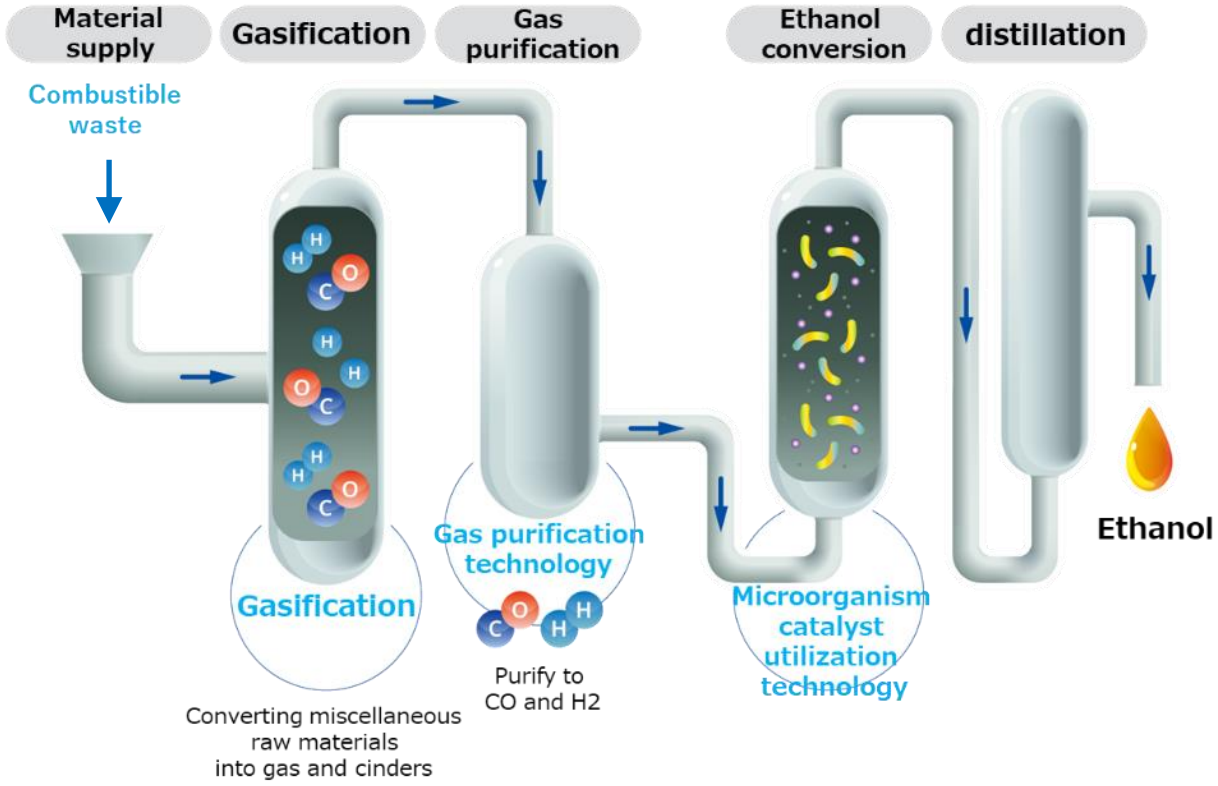
Reference (1)

◆BR Ethanol Technology

In 2017, SEKISUI CHEMICAL and LanzaTech NZ, Inc. established production technology that converts combustible waste collected in a waste disposal facility without any waste separation before purifying the gas and then utilizes a microbial catalyst and gas fermentation technology developed by LanzaTech NZ, Inc. to convert the gas into ethanol without any chemical catalysts, heat or pressure. Garbage exists in large amounts around the world, but its commercial use has been very difficult up to this point. This innovative technology uses waste as an alternative resource to fossil fuels. Normally, combustible waste is incinerated before being used for power generation. BR ethanol technology makes it possible to convert waste into gas while also converting some of the CO_2 produced into ethanol and contribute to reducing the emission of CO_2.

<BR Ethanol Technology Outline>



Reference (2)

◆SEKISUI BIO REFINERY CO., LTD.

Location: 2-10-4 Toranomon, Minato-ku, Tokyo

Representative: President and Representative Director: Toru Ryoso

Established: April 2020

Investment ratio: SEKISUI CHEMICAL: 66%, INCJ: 34%

Business details: BR ethanol technology verification business and business deployment for BR ethanol technology