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Joint Effort on Sewage to Hydrogen Breakthrough Technology **Tokyo Metropolitan Sewerage Bureau Undertakes Field Research with** **Private Sector**

Japan Blue Energy Co., Ltd. (Head Office: Minato-ku, Tokyo, President: Naoki Dowaki).("JBEC"), TODA CORPORATION Co., Ltd. (Head Office: Chuo-ku, Tokyo, President: Masanori Imai). ("TODA Corporation"), TOKYU CONSTRUCTION CO.,LTD. ("TOKYU Construction"), CHIYODA KENKO CO.,LTD. ("CHIYODA Kenko")

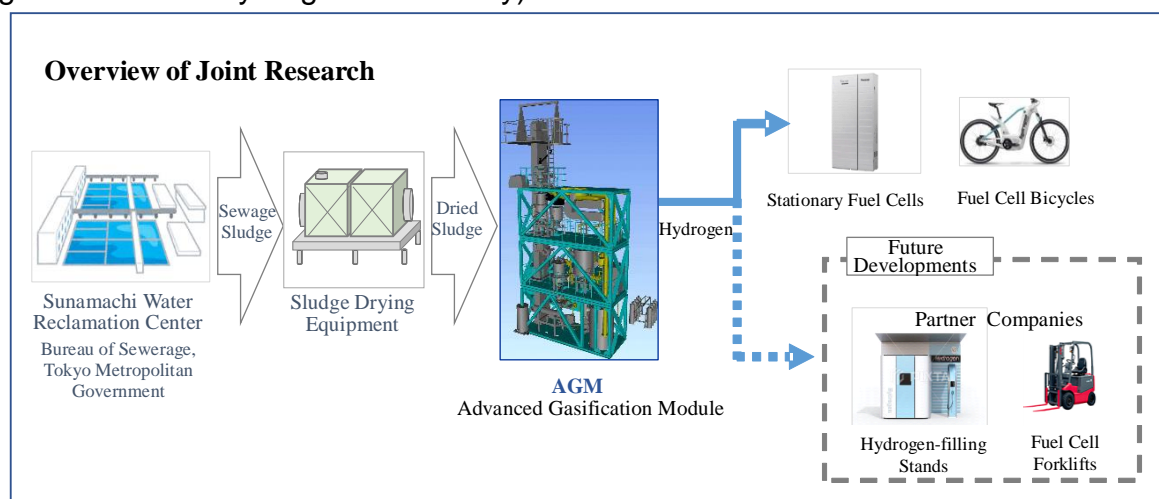
Joint research on sewage-based hydrogen generation agreed Nov 19, 2020 between the above five companies and Tokyo Metropolitan Government aims to acquire “know-how and real-world experience” on this breakthrough technology for Tokyo’s Sewerage Bureau. Nearly completed equipment installation at the sewage research facility located within the Tokyo Sunamachi Water Reclamation Center will allow joint research commencing this spring to commercialize the innovative patented technology for generating hydrogen from sewage sludge. JBEC, the technology patent holder, acts as technology manager while TODA Corporation assumes the role of representative secretary for this research project which is joined by TOKYU Corporation, and CHIYODA Kenko, as well as a research group led by Professor Kiyoshi Dowaki of Tokyo University of Science. Cumulative technologies developed over 19 years since 2002 enabled JBEC to produce hydrogen from primarily wood-chip biomass resources using a unique gasification technology termed the "BLUE process". However, limited near-term growth prospects for the hydrogen market and commercialization prompted JBEC to explore a reduced-cost container-sized modular design (AGM) scalable via mass production and also offering the additional capability of utilizing waste products (general combustible waste, waste plastics, etc.) for hydrogen production. JBEC’s resultant "Waste to Energy" (energy conversion of waste) approach is anticipated to dramatically improve commercial feasibility with a dual business model enabling both "decarbonized" hydrogen production as well as waste reduction. Building on these developments, JBEC's latest gasification process is being employed in the current co-research between the private, public, and academic sectors

aiming to achieve both sewage sludge reduction treatment with low environmental impact and stable hydrogen production technology.

【Outline of joint research】

At the Sewerage Technology Research and Development Center in Sunamachi Water Reclamation Center, Tokyo, a demonstration of theory test plant (treatment capacity: 1dry ton/ day) combining the sewage sludge drying technology with JBEC's gasification technology has been installed, and the following goals will be pursued by the on-site gasification treatment of sewage sludge.

1. Demonstration and verification of a self-sustaining operation not requiring external fuels (including auxiliary fuels) such as fossil fuels
2. Demonstration and verification of the sewage sludge reduction treatment process and accompanying low environmental impact inclusive of CO₂ emissions
3. Demonstration and verification of stable sludge treatment and hydrogen production employing extended continuous operation. Although not a joint research target, a further goal will be to demonstrate and verify the utility compatibility of the generated hydrogen gas (including fuel cell power generation and hydrogen for mobility).



【Schedule】

Mid-March 2021....Installation completion of a single demonstration plant

March 31, 2021.....Test operation completion of the installed equipment

After April 2021.... Demonstration operation commences

【Future development】

1. Demonstration and verification of waste plastic as feedstock
2. Commercialization study (Feasibility Study+ Engineering) of sewage sludge 60 dry ton daily processing capacity facility (large plant type)

“Renewable hydrogen is an important clean energy fuel for Tokyo and the world,” said Naoki Dowaki, President of Japan Blue Energy. “We spent more than a decade developing this advanced process to convert waste into hydrogen and it is encouraging to see hydrogen demand growing in Japan and globally, as we complete our first Tokyo hydrogen production facility.”

With 95 percent of the world’s hydrogen produced from natural gas and coal, JBEC is working to supply clean hydrogen to replace fossil fuels for mobility, power generation and other applications.