



February 21, 2024
Tsubame BHB Co., Ltd.

Tsubame BHB procures 5.3 billion yen through Series C

First participation by a foreign investor brings green ammonia production to the world

Tsubame BHB Co., Ltd. (Head Office: Yokohama, Kanagawa Pref.; Representative Director and CEO: Koji Nakamura), which strives for the social implementation and commercialization of small, distributed ammonia production plants, has announced that it has undertaken capital procurement on a total scale of approximately 5.3 billion yen in a Series C round of financing through third-party allocation of shares to both new and existing investors worldwide.

In the second round*¹ of this Series C funding, capital procurement was undertaken with Heraeus Beteiligungsgesellschaft mbH (Head Office: Germany; “Heraeus”) as the first overseas investor receiving shares, and with Yokogawa Electric Corporation and Energy & Environment Investment, Inc. as new investors receiving shares in Japan. This round of funding resulted in a cumulative capital procurement amount of 7.6 billion yen for Tsubame BHB Co., Ltd.

*1 The first round of funding was procured through convertible equity (CE) subscription warrants in July 2022

Tsubame BHB was established in April 2017 to achieve the social implementation and commercialization of on-site ammonia production at small, distributed ammonia production plants capable of synthesizing ammonia at low temperatures and low pressures, using the world’s first electrified catalyst method. The Heraeus Group, based in Hanau, Germany, is a major family-owned technology company with multifaceted global operations. It has approximately 17,200 employees in 40 countries around the world, and boasts a diverse business portfolio that includes fields such as metals and recycling, healthcare, semiconductors and electronics, and industrials. With Heraeus participating as the first overseas investor, Tsubame BHB will develop the ammonia business and strengthen supply chains with a particular focus on Europe.

The EU decided to introduce a Carbon Border Adjustment Mechanism (CBAM) for the first time in the world, requiring businesses to report on carbon emissions from October 2023. Actual taxation based on these emission volumes is scheduled to begin from 2026. On February 6 of this year, the European Commission announced that CO₂ emissions in the EU should be cut to 90% compared to 1990 levels by 2040. Given the need for CO₂ reductions and actions to combat climate change in the EU, there is a growing demand for green ammonia, particularly in the

chemical, transportation, and agricultural industries.

The synthetic ammonia catalysts offered by Tsubame BHB, which are produced at low temperatures and low pressures using electrified catalysts, can be manufactured at small ammonia production plants, and so can be produced and consumed locally. Transport and storage processes are reduced in comparison to current procurement methods involving high-volume production at petrochemical complexes, enabling a substantial reduction in CO₂ emissions.

In collaboration with Heraeus, which has a history spanning close to 400 years, Tsubame BHB uses an electrified catalyst technology developed in Japan to promote the localization of ammonia production at small, distributed on-site ammonia plants, and the manufacture of green ammonia and hydrogen ammonia using renewable energy.

Ref:

JETRO: Preparing for the EU Carbon Border Adjustment Mechanism (CBAM) (in Japanese)

(<https://www.jetro.go.jp/biz/areareports/special/2023/0801/a48cfe7206a68970.html>)

Reuters: EU recommends 90% reduction in greenhouse gases by 2040; recommendations pulled back in the agricultural field (in Japanese)

(<https://jp.reuters.com/world/environment/2YE3DVPVUFMYRC444OITUNZ24E-2024-02-06/>)

■ Current status of business/development

The first installation project in Japan, ordered in December 2022, is currently moving ahead steadily with plans for the start of production in August 2025. Detailed design and procurement are already complete. Receipt testing at the main device plant will begin from April 2024, and deliveries to the construction site are scheduled to begin in May.

Tsubame BHB has an R&D Center at the Tokyo Institute of Technology, where R&D targeting catalysts is conducted in collaboration with about 30 researchers. Verification tests of catalysts developed at a pilot plant in Ajinomoto Co., Inc.'s Kawasaki factory began in 2019, and over the course of four years, these tests confirmed that Tsubame BHB's technologies had transcended the laboratory level, meeting requirements for commercialization. Catalysts suited to on-site ammonia plants are at the commercialization stage. Tests confirmed that formation and increased production on a scale of more than 100,000x could be achieved, and that after four years of uninterrupted catalyst performance operations, there was absolutely no decline in performance.

Applying government subsidies, commercialization of next-generation catalysts is expected to be achieved in a short time, with further cost reductions scheduled for the future.

■ Tsubame BHB receives orders for basic design in Japan and overseas

In December 2023, Tsubame BHB received its first order for the basic design of an overseas unit in Southeast Asia. Production of green ammonia is expected to begin from FY2026. A project order was also received for basic design on a second unit in Japan, with ammonia production similarly scheduled to begin during FY2026.

In December 2023, a letter of intent (LOI) was signed between Agri Laos Co., Ltd. (“Agri Laos”), a business partner in Laos, and the Laotian State Enterprise for Agriculture Service (“SAS”) regarding an offtake agreement for low-carbon fertilizers. Tsubame BHB and Agri Laos have formed a special purpose company (SPC) to promote the development of projects involving the manufacture of green hydrogen and ammonia and low carbon fertilizers using renewable energy and hydroelectric power in Laos. SAS plans to purchase the low-carbon fertilizers produced on this project for sales in Laos and other countries.

Tsubame BHB has received an increasing number of inquiries from overseas companies, and has initiated projects targeting the on-site production of ammonia at small-scale plants in collaboration with companies in various countries in North and South America, Southeast Asia, and Africa.

■ Future developments

The capital procured through this round of financing will go toward R&D targeting further cost reductions at small, distributed ammonia plants and the commercialization of medium-scale plants, as well as technical development costs for next-generation catalysts with a view toward large-scale plants and recruiting/labor costs, which are particularly important in the context of business operations. In this way, Tsubame BHB will contribute to the commercialization of small-scale ammonia production plants originating in Japan.

■ Investors in this round

Along with Tsubame BHB’s first overseas investor, Heraeus Beteiligungsverwaltungsgesellschaft mbH, investors participating in this round of financing will include the following companies:

List of participating investors (no specific order):

New investors: Heraeus Beteiligungsverwaltungsgesellschaft mbH, Yokogawa Electric Corporation, and Energy & Environment Investment, Inc.

■ Comments from investors participating in this round

Heraeus Beteiligungsverwaltungsgesellschaft mbH

“Heraeus has long established itself as a leader in innovation in the field of precious metal-based technologies. The Tsubame BHB technology fits perfectly with the Heraeus scouting criteria supports our efforts to lead the development of cutting-edge sustainable technologies,” said Dr. Philipp Walter, Executive Vice President Business Line Hydrogen Systems at Heraeus. “The technology complements our already broad range of sustainable solutions and helps to strengthen our position in a market that is increasingly focused on energy efficiency and decarbonization.”

“Japan is a market where innovation is born – especially in the area of advanced materials. As a globally leading material technology company, Heraeus sees great potential in a stronger collaboration with Japanese companies, universities, and research institutes. Our investment in Tsubame BHB is a great example how Japanese and German companies can profit and grow together in future markets.” added Hideto Yamauchi, Representative Director, President of Heraeus K.K. in Japan.

Yokogawa Electric Corporation

“Various efforts are being made around the world to realize a decarbonized society, and Yokogawa is paying attention to these new energy trends. Like our customers, we believe that there will be a rising need for ammonia as a hydrogen transport medium and fuel. Yokogawa considers that Tsubame BHB's innovative technology for the production of ammonia at a low temperature and pressure will play a key role in the attainment of a decarbonized society. By utilizing our company's measurement, control, and information technologies, we will work together with Tsubame BHB to sustain the creation of value and address social issues,” commented Koji Nakaoka, a senior vice president and head of the company's Energy & Sustainability Business Headquarters and Global Sales Headquarters

Energy & Environment Investment, Inc.

“Amid an urgent demand for decarbonization in various fields, ammonia is expected to be used not only as a hydrogen carrier, but also as a clean fuel in its own right, with applications for single fuel ammonia combustion in large-scale transportation (e.g., ships and aircraft) as well as thermal power generation. It has the potential to be a key driver in decarbonization, but in order to achieve this goal, renewable energy must be used in the manufacturing process as well “said by Member of the Board and Partner: Kenyu Hosoya. “Using Tsubame BHB’s technologies, ammonia can be manufactured at low temperatures and low pressures, enabling small, distributed manufacturing facilities. In this way, in addition to supporting the worldwide use of green ammonia manufactured using renewable energy, these technologies are expected to contribute to decarbonization as well.”

■ Outline of investors participating in this round

Heraeus Beteiligungsverwaltungsgesellschaft mbH

The Heraeus Group, based in Hanau, Germany, is a global company with about 17,200 employees, operating in 40 countries around the world, and boasting cutting-edge technologies. Founded in 1660, Heraeus has a diverse business portfolio, with activities in fields such as metals and recycling, healthcare, semiconductors and electronics, and industrials.

Yokogawa Electric Corporation

Yokogawa Electric, a major electrical equipment company, is one of Japan’s top manufacturers specializing in industrial instruments and process control systems. Using measurement, control, and information technologies, it contributes to resolving social issues through business in the control, measurement, communications, and life science fields.

Energy & Environment Investment, Inc.

Energy & Environment Investment was established in 2006 as a venture capital company specializing in the energy and environmental fields. It invests in and supports the growth of startup companies with innovative business models and technologies that contribute to the realization of a sustainable society, with a particular focus on decarbonization.

■ **About Tsubame BHB (<https://tsubame-bhb.co.jp/en>)**

Tsubame BHB's corporate philosophy is to "resolve issues faced by mankind in the context of environmental and food related issues through the use of original technologies, in order to achieve a sustainable society." We are a deep tech company that strives for practical applications of on-site ammonia production at small, distributed plants using technologies that dramatically reduce the extraction of CO2 in comparison to conventional methods, by producing ammonia at low temperatures and low pressures. Founded in 2017, we utilize electrified catalyst technologies developed by Honorary Professor Hideo Hosono of the Tokyo Institute of Technology, and we are currently strengthening the rollout of overseas business with a focus on regions including North and South America, Australia, and Africa. Last year, we were invited by the Japanese government to attend the 28th Conference of the Parties to the UN Framework Convention on Climate Change (COP28), where we had an exhibit booth.

Company name: Tsubame BHB Co., Ltd.

Representative Director and CEO: Koji Nakamura

URL: <https://tsubame-bhb.co.jp/en>

Head Office: 6th floor, Shin-Yokohama Square Building; 2-3-12 Shin-Yokohama, Kohoku-ku, Yokohama, Kanagawa Prefecture

Established: April 2017

Description of Business:

- R&D, sales, and facilities maintenance related to on-site ammonia supply systems
- R&D, manufacturing and sales of synthetic ammonia catalysts
- Manufacture and sales of ammonia and ammonia related products

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