

Tsubame BHB brings distributed Ammonia production into climate transition spotlight

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Japanese deep-tech innovator Tsubame BHB has been selected by the Tokyo Metropolitan Government to participate in a pioneering initiative that will produce nitrogen fertilizers from green hydrogen generated within the city, marking a significant step toward the decarbonization of both ammonia manufacturing and agricultural input supply chains.

The project forms part of Tokyo's broader hydrogen strategy, which seeks to establish a self-sustaining 'produce, transport, and use' ecosystem capable of accelerating the transition to a low-carbon economy. Under the agreement, green hydrogen produced at a renewable energy-powered facility in Keihinjima, Ota Ward, will be supplied to Tsubame BHB's pilot ammonia synthesis plant, where it will be converted into ammonia and subsequently used as feedstock for the trial production of nitrogen-based fertilizers.

The initiative reflects growing global interest in reducing the carbon footprint of ammonia, one of the world's most strategically important industrial chemicals and the foundation of modern nitrogen fertilizer production. Conventional ammonia manufacturing relies heavily on grey hydrogen derived from natural gas, making the sector one of the largest industrial sources of greenhouse gas emissions. Replacing fossil-fuel-based hydrogen with renewable alternatives is increasingly viewed as a critical pathway toward achieving climate targets across agriculture and industry.

For Tsubame BHB, the project represents another milestone in its effort to commercialize a radically different model of ammonia production. Founded in 2017, the company has developed decentralized ammonia synthesis systems that operate using a proprietary low-temperature, low-pressure process, significantly diverging from the traditional Haber-Bosch method that has dominated global ammonia production for more than a century.

At the heart of the technology lies an advanced electrified catalyst developed by Honorary Professor Hideo Hosono of the Institute of Science Tokyo, formerly known as the Tokyo Institute of Technology. The catalyst enables ammonia synthesis under substantially milder operating conditions than conventional systems, potentially reducing energy consumption while making smaller-scale production economically viable.

The innovation addresses one of the long-standing structural limitations of the global ammonia industry. Traditional Haber-Bosch facilities require enormous capital investments and operate most efficiently at very large scales, leading to the concentration of production in a limited number of industrial hubs. As a result, ammonia and fertilizer products often travel vast distances before reaching end users, creating significant logistics, storage, and transportation costs.

Tsubame BHB's decentralized approach seeks to reverse that paradigm by enabling ammonia production closer to points of demand. By deploying compact, modular facilities near agricultural, industrial, or energy consumption centers, the company aims to reduce dependence on long-distance supply chains while improving local access to fertilizer and ammonia-based products.

The commercial implications extend well beyond Japan. The company has already secured orders for two ammonia production units domestically and reports ongoing discussions for potential deployments across emerging markets in Brazil, India, and several countries in Africa. These regions often face elevated fertilizer costs due to import dependence and complex logistics networks, making localized production models particularly attractive.

The Tokyo project therefore serves not only as a demonstration of green hydrogen utilization but also as a proof of concept for a broader transformation in ammonia economics. By integrating renewable energy, green hydrogen production, decentralized ammonia synthesis, and fertilizer manufacturing within a single regional ecosystem, the initiative highlights a pathway toward more resilient and sustainable agricultural input systems.

As governments and industries worldwide intensify efforts to decarbonize fertilizer production, projects such as this are increasingly being viewed as test cases for the future of ammonia. Rather than relying exclusively on large-scale centralized plants, the next generation of fertilizer production may be characterized by distributed facilities capable of producing low-carbon ammonia closer to farms, industries, and end users.

For Tokyo, the initiative reinforces its ambition to position hydrogen at the center of urban decarbonization. For Tsubame BHB, it offers an opportunity to demonstrate that advanced catalyst technologies and decentralized production models can transform ammonia from a globally traded commodity into a locally manufactured, low-carbon resource.

If successful, the project could provide a blueprint for how cities, industries, and agricultural systems collaborate to create cleaner, more resilient fertilizer value chains in an increasingly carbon-constrained world.