

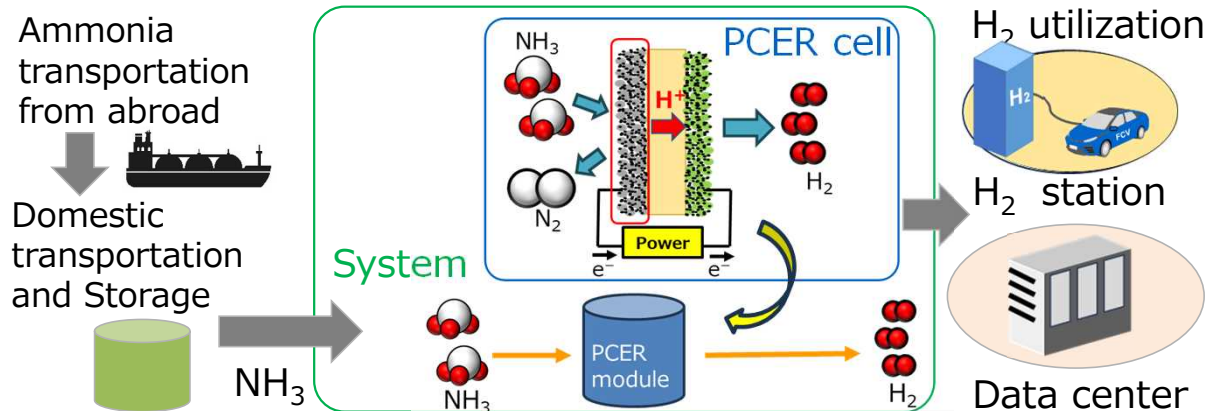
Project Title : International joint R & D on ammonia decomposition systems toward the realization of on-site hydrogen supply (2024~2027*) *scheduled



Entrusted Parties : Institute of Science Tokyo (Science Tokyo), National Institute of Advanced Industrial Science and Technology (AIST), Central Research Institute of Electric Power Industry (CRIEPI)

Outline of the Project

- **Background:** Ammonia is an excellent hydrogen energy carrier with easy transportation and high storage capacity, and a compact, low-cost $\text{NH}_3\text{-H}_2$ conversion system that can be installed on-site is required for widespread use.
- **Objective:** Develop a protonic ceramic electrochemical reactor (PCER) for realizing an innovative ammonia decomposition hydrogen supply system.
- **R&D content:** By performing three processes in one step: (1) ammonia decomposition reaction, (2) hydrogen separation, and (3) hydrogen pressurization, high efficiency, miniaturization, and cost reduction will be achieved. To this end, we work on the development of an ammonia decomposition electrocatalysts, the development and demonstration of PCER cells, and the numerical model analysis of an ammonia decomposition system.



Significance of International R&D

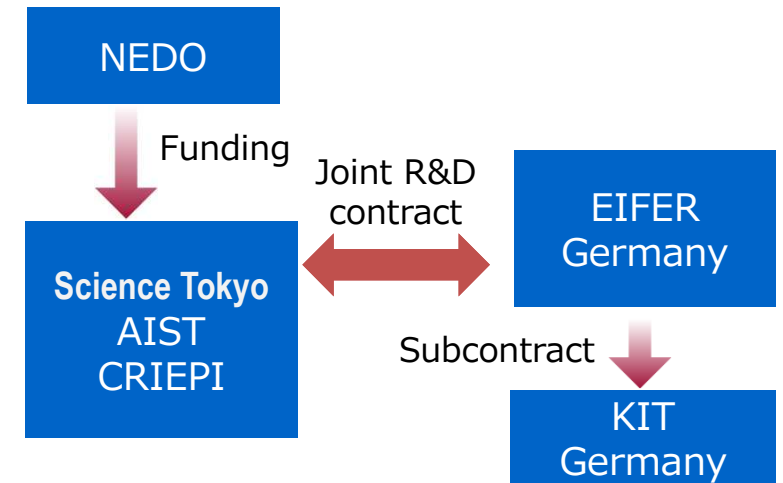
Significance • There are many technical issues to be addressed to realize PCER technology, such as materials, processes, and the use of ammonia. R & D can be carried out efficiently and smoothly by using the knowledge and experience of leading overseas research institutes.

• **European Institute for Energy Research (EIFER)** and **Karlsruhe Institute of Technology (KIT)** are leading the way in hydrogen-related technologies, protonic ceramics production, and ammonia utilization.

Roles of overseas organizations • EIFER : support PCER large-area expansion and ammonia decomposition experiments.

• KIT : support electrode reaction modeling under the subcontract with EIFER.

Project Scheme



Expected Outcomes

<Image of social implementation>

After importing ammonia from abroad, ammonia is transported to various regions, in addition to use in large-scale thermal power plants ⇒ On-site storage of ammonia ⇒ Converted to hydrogen on the spot and used with PCER.

<Economic effect>

- PCER market size: ca. 270 billion JPY/year
- Potential demand for hydrogen: ac. 1 trillion JPY/year

<CO₂ reduction effect>

- 29 million t/year

< Companies and industries involved>

• Heavy industry manufacturers, plant engineering companies, system manufacturers, ceramics manufacturers, energy providers (electricity, oil, gas)