

# Project Name: International Joint Research for Metal-Free Redox Flow Battery

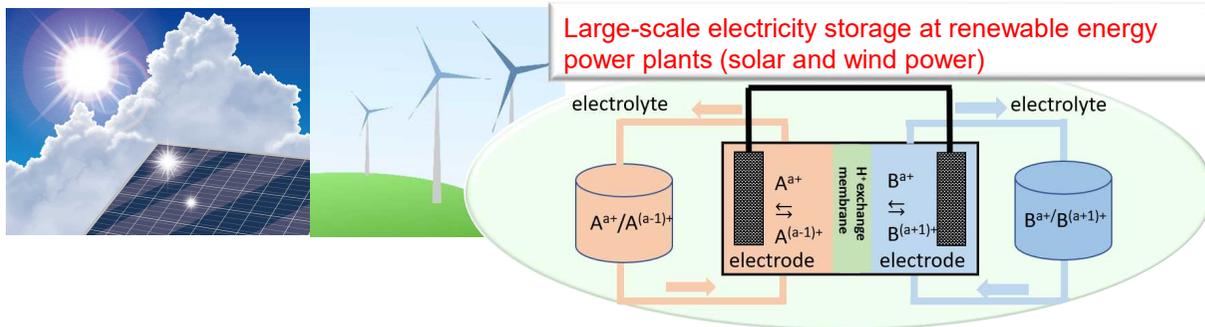
(2020–2023)

Entrusted party: National Institute of Advanced Industrial Science and Technology (AIST)



## Outline of the project

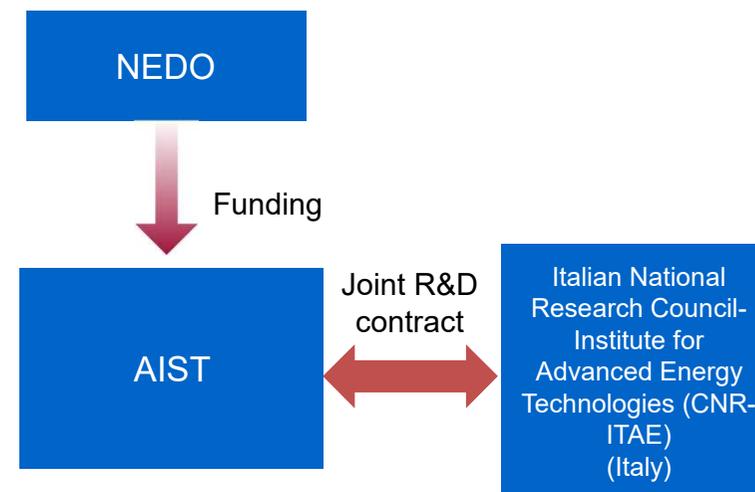
- The maximum use of renewable energies in the power sector is essential for building a zero-emission society. To use them in a stable manner, high-performance rechargeable batteries on the power supply side become increasingly important. However, the large-scale introduction of renewable energy into the grid has not yet been achieved due to resource constraints, cost, and safety issues.
- Redox flow batteries (RFBs) are expected to be suitable for large-scale power storage and have a long-life, but the challenge is to improve their performance dramatically and free them from resource constraints, which will contribute to cost reductions in future.
- In this project, we will develop innovative metal-free RFBs using new organic materials as redox centers and electrocatalysts in order for cost reduction and freedom from resource constraints.



## Significance of international R&D

- Development of RFBs using organic-inorganic hybrid ion exchange membranes, which are based on a core technology from the Italian National Research Council- Institute for Advanced Energy Technologies (CNR-ITAE).
- By supplementing AIST's core technologies of organic material development, RFB system development, and cutting-edge synchrotron radiation analysis with CNR-ITAE's ion-exchange membrane fabrication technology, we can dramatically improve the performance of low-cost RFBs.

## Project scheme



## Expected outcomes

- Due to the spread of redox flow batteries, a large amount of power can be stored, and further introduction of renewable energies will be realized.
- Expected CO<sub>2</sub> reduction effect (CO<sub>2</sub> emission reduction amount=25 million tons of CO<sub>2</sub>/year)
- Large-scale market for secondary batteries for grid electricity storage systems is expected by 2030, with a 50% contribution from this project.