Project Title: International Collaborative R&D on Diagnostic Technology for Degradation of Used Lithium-Ion Battery Packs (2024-2027*) *scheduled

Entrusted Parties: Tokai National Higher Education and Research System(Nagoya University), Kyoto University, The Central Research Institute of Electric Power Industry, The Ritsumeikan Trust
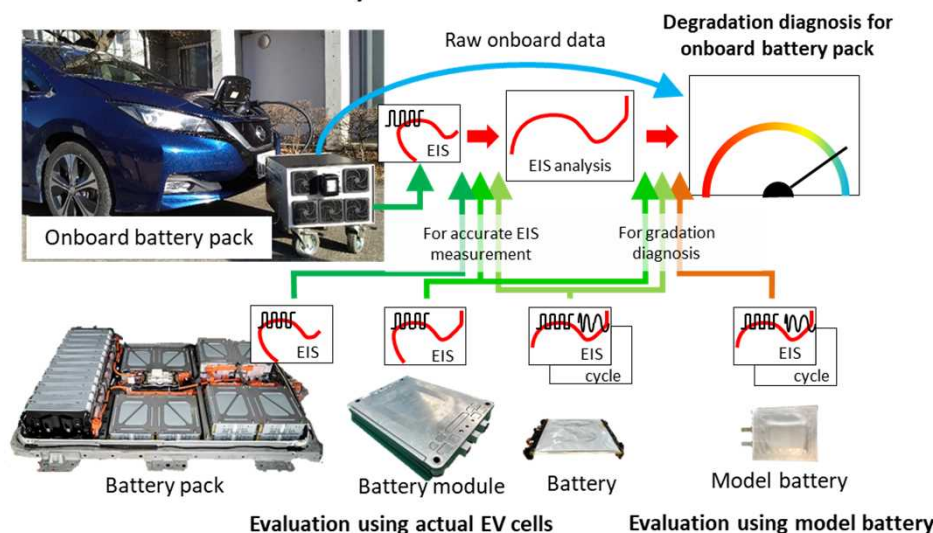
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Outline of the Project

Background: By 2040, over two million electric vehicle battery packs will be reaching the end of their lifespans every year in Japan. As the demand for EV batteries continues to grow, accurate diagnostic technologies are essential to assess and grade used batteries for repurposing or disposal.
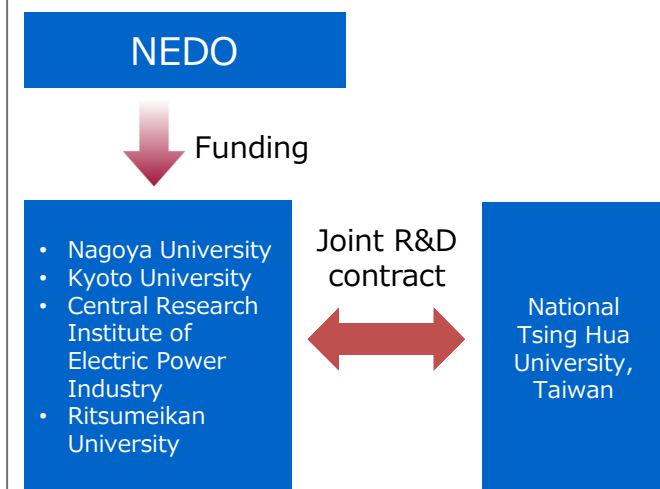
Objective: This project will develop diagnostic technology to assess a battery's condition without removing it from the vehicle. This will make it easier for vehicle owners to obtain data on battery degradation and allow batteries to be graded as either usable, repurposable, or recyclable.

Research: High-accuracy degradation diagnostic methods will be established using simplified waveforms, such as square and superposed waveforms, to analyze the current-voltage responses of battery packs while they are in place. Studying actual and model batteries, and single cells as well as packs, will support practical applications.

Accurate EIS Measurement and Degradation diagnosis of Li-Ion Battery Packs Based on Raw Data Evaluation

Project Scheme

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Funding

- Nagoya University
- Kyoto University
- Central Research Institute of Electric Power Industry
- Ritsumeikan University

Joint R&D contract

National Tsing Hua University, Taiwan

Expected Outcomes

- Enabling battery pack condition diagnosis without removal from the vehicle via rectangular wave impedance method
- Development of diagnostic devices for measuring battery impedance
- Development of evaluation technology for battery grading
- Expected CO_2 reduction by 2040: 350,000 to 430,000 tons per year
- Expected energy savings: Equivalent to 1,206 kiloliters of crude oil per year

Significance of International R&D

In Taiwan, the use of electric scooters and motorcycles is widespread and used lithium-ion battery packs are commonly circulated, which has led to the development of advanced diagnostic technology. Joint research with Taiwanese universities will allow comparison of test results and accelerate degradation diagnostics research.