

# Demonstration Project Utilizing Hybrid Battery Energy Storage System in the Oki-Islands

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## Abstract

### 1. Introduction

In Japan, integration of renewable energy sources (RES) such as photovoltaics (PV) and wind turbines (WT) into power system has accelerated since the introduction of feed-in tariff scheme. Since output power of RES fluctuates due to weather conditions and this influence could become severe in an isolated small power system of remote island, measures against the output fluctuation is required under large penetration of RES.

The Chugoku EPCo has developed a hybrid battery energy storage system (BESS) composed of different 2 types of batteries with Mitsubishi Electric Co. and has been engaging in a demonstration project since September 2015 in a commercial power system of the Oki-islands in order to maximize introduction amount of RES.

This project was subsidized by the Ministry of the Environment.

### 2. Overview of the demonstration project

The fluctuation of RES output could be categorized into “short-term fluctuation” due to such as transit of cloud and “long-term fluctuation” due to such as change in position of the sun. In the project, we have constructed a hybrid BESS, in which Lithium ion (Li-ion) battery absorbs short-term fluctuation and Sodium-sulfur (NaS) battery absorbs long-term fluctuation in a coordinated method of control.

Also, coordination control between existing diesel generators and the hybrid BESS, efficient charge-discharge management and control methods of BESS have been demonstrating in the project.

A location of the Oki-islands and an overview of the project are shown in figure 1 and 2, respectively. By integrating the hybrid BESS, we have been aiming to introduce about 11 MW of RES in total, by newly introducing 8 MW in addition to the existing 3 MW of RES, which exceeds the minimum demand (about 10 MW).

We have installed NaS battery system of 4.2 MW (25.2 MWh) and Li-ion battery system of 2.0 MW (0.7 MWh). The exterior of each battery is shown in figure 3.

To realize coordination control, we have constructed an Energy Management System (EMS), linking the hybrid BESS, diesel generators, renewable energy power stations and control center via communication network.



Fig.1 A location of the Oki-Islands

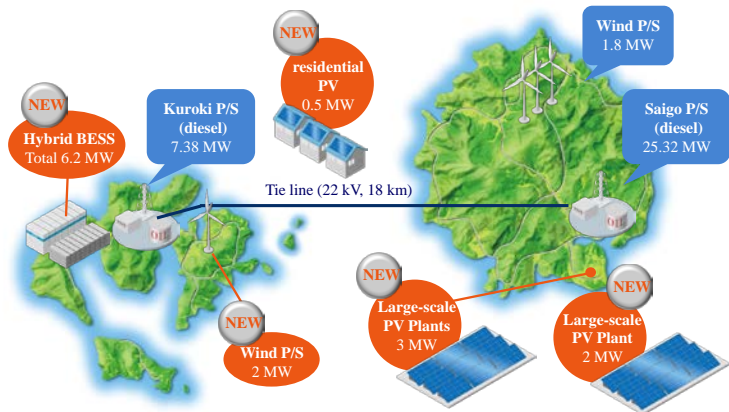


Fig.2 Overview of the demonstration project



<NaS battery>

<Lithium ion battery>

Fig.3 Exterior of Batteries

### 3. Conclusions

Utilizing hybrid BESS for power system control is the first challenge in Japan, and we will have been engaging in the demonstration project for 3.5 years by March 2019 to resolve technical challenges under large penetration of RES.