

Engineering Service: Renewable Energy Development

Features

Formulating the power supply development/improvement plan using following renewable energy technologies, and demonstrating the effect and the feasibility of the plan.

- ◆ Photovoltaic Power Generation
- ◆ NAS (Sodium-Sulfur) Battery
- ◆ Small-Scale Hydro Power
- ◆ Biomass Energy

Basic Concept or Summary

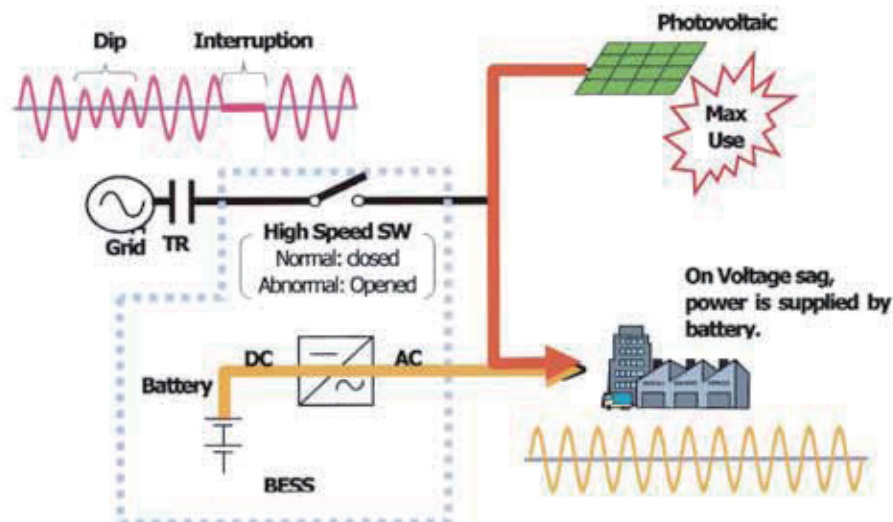
1. Hybrid Power Supply System with Photovoltaic and Battery
2. NAS (Sodium-Sulfur) Battery as a New Secondary Battery
3. Feasibility Study on Renewable Energy Development

Example 1. Hybrid Power Supply System with Photovoltaic and Battery

Combining the renewable power sources such as photovoltaic with the battery, power supply with high reliability and quality is realized for small part of the network in the city area or the industrial area.

[Features]

- ◆ Power supply with high reliability and quality
 - Less voltage/frequency fluctuation
 - Compensating voltage dip
 - Compensating short time interruption
- ◆ Maximum utilization of fluctuating power sources such as photovoltaic
 - Dealing with the increase of power energy consumption and peak demand
- ◆ More economical power supply
 - Most economical operation of power sources with utility network, photovoltaic, local EG, battery, and so on



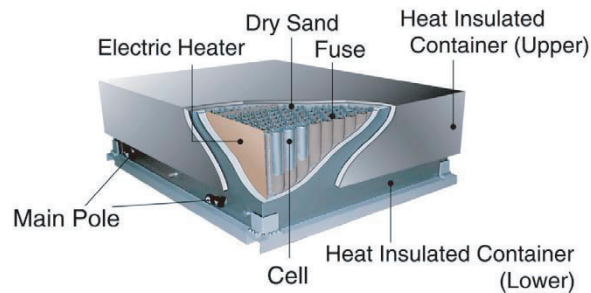
Example 2. NAS (Sodium-Sulfur) Battery as a New Secondary Battery

Technical services for feasibility study, design, installation, operation, and maintenance on NAS batteries

- ◆ High performance
 - High efficiency, 83%
 - Longevity, 2500 cycles & 15-year-life span
 - High energy density, 3 times of a lead-acid battery
 - Easy maintenance

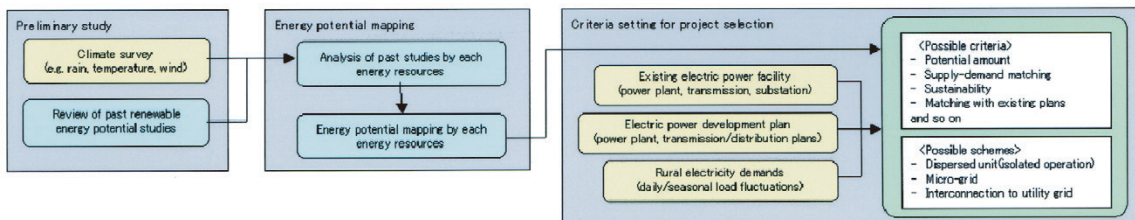
- ◆ Application
 - Peak shaving (energy cost reduction)
 - Power quality improvement
 - Transmission & distribution investment deferral
 - Renewable power support

Diagram of the structure of a module



Example 3. Feasibility Study on Renewable Energy Development

For improving the electrification rate and environmental conservation, resources of renewable energy and their usage are studied in the viewpoints of government policy, economic efficiency, environmental effect, and so on, and the feasible renewable energy development projects are formulated.



Effects or Remarks

- ◆ Reducing dependence on peak power supply from fossil fuels
- ◆ If the demand peak comes at night, in developing countries and elsewhere, the energy can be produced by solar generation and stored, then used at night, reducing the use of diesel-powered generation.
- ◆ Expanding the range of application of renewable energy

Installation in Practice or Schedule

- Overseas**
- ◆ International Cooperative Demonstration Project for Stabilized and Advanced Grid-Connection of Photovoltaic Systems, Malaysia (2007)
 - ◆ Bio Fuel Feasibility Study, Malaysia (2007)
 - ◆ Renewable Energy Development Study, Fiji, (2007)
 - ◆ Renewable Energy Development Study, Bangladesh, (2006)
 - ◆ Renewable Energy Development Study, India (2004)
 - ◆ Demonstrative Research on Efficient Photovoltaic Power Generation Units for Grid-Connected System, P. R. China (2003)
 - ◆ Demonstrative Research on Small-Scale Pumping Hydro with Photovoltaic System, Laos (2003)

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