Abstract Format

Technologies reshaping the electricity supply industry
2017 IERE-TNB Putrajaya Workshop
November 20-23, 2017

Recent examples of effort by low carbonized countries to expand the introduction amount of renewable energy

Joji Kawano
Deputy Senior Research Associate, Research Department, Japan Electric Power Information Center
Tokyo, Japan

Keywords: *renewable energy, power storage facilities, demand response (DR)*

Abstract

The introduction of power generation through renewable energies such as wind and photovoltaic is progressing globally with the aim of realizing a low carbon society and reducing the environmental load. Europe and the US, due to the increase in these intermittent power supplies, have faced various problems, and electric utilities have had to respond. Intermittent power supplies have suddenly brought about more fluctuations in power generation capacity, more frequency fluctuations, and less power inertia in the system. It is an urgent task to deal with voltage increases and excessive allowable current of electric wires in the field of power distribution. For example, in the state of Hawaii in the United States which is known to have a high growth rate of photovoltaic power generation, voltage fluctuations exceeding the range of standard voltage occur, and this is increasing day by day. In response to these conditions, the state of California and Hawaii, which are the most advanced regions for renewable energies are taking the measures of replacing facilities, and reviewing the operation methods of facilities to solve each regional problem.

Measures in facilities and operations in these areas can be roughly sorted into the following three categories.

1. Improvement of prediction accuracy for output fluctuations through intermittent power supplies
2. Peak demand management
3. Introduction of countermeasure equipment for the mass introduction of renewable energies

These solutions are expected to be realized through progress in IoT technology and the reduction of communication costs. In addition, in these states storage batteries are connected to distribution substations for the purpose of increasing the installation of additional photovoltaic generation facilities. Some advanced aggregators are making advanced efforts such as selling storage batteries to customers' homes for the purpose of using cost-effective renewable energy. Furthermore, in areas where renewable energy is being introduced, electric vehicles are regarded as part of the power storage facilities, and various efforts have been made towards the massive introduction of electric vehicles. Due to this massive introduction of electric vehicles, it is conceivable that the mode of usage electric power will change greatly in the future.

This report focuses on precedent cases and trends that are taking place in these areas, and summarizes and introduces the advantages and challenges, feasibility, and cost and effect of these proposed solutions.