CENTRALE SOLAIRE THERMODYNMIQUE EN RESEAU NON INTERCONNECTE

CONTRAINTES ET DIMENSIONNEMENT DU STOCKAGE THERMIQUE ASSOCIE

Auteur : Marc Benmarraze

Présentation au Journées nationales de l'Energie Solaire- Perpignan- juin 2016

1. Abstract

Rapid renewable energy technology cost reductions -especially in CSP technology-have opened significant new opportunities to transform the energy landscape in islands [1], but in most areas, renewable energy potentials in islands are yet to be harnessed. With a strong political momentum created by the global focus on climate and new financing instruments coming on-stream, as well as continuous innovation in renewable energy technologies, there are great prospects for accelerated deployment of renewables on islands. In the recent years, islands have been early supporters of renewable energy technologies to reduce the burden of high energy costs through economically viable and promising solutions to their energy challenges. Many have taken great strides towards energy transformation through the roll out of national energy plans with bold renewable energy targets and innovative technical approaches which require significant new investments in modernizing the existing electricity distribution grids.

The grid connection of renewable energies raises many technical issues mainly due to the intermittent nature of the renewable production [2]. Most of them require some detailed impact studies to carry out through the Transmission system operators (TSO). The intermittent nature of renewable energy sources is generally not significant on interconnected grid areas but could lead to an impracticable obstacle on idle grid conditions which are met in island areas. [3,4]. The intermittent power generation endues voltage drops hardly bearable for the grid. This is why the technical requirements of TSOs in these particular areas are much more demanding and there is often little deviation allowed for each of technical requirements. All renewable energy sources have to demonstrate their capability for power supply adjustment [5]. Several solar power plants with energy storage are today in operation (PV and batteries cell [6] or CSP) but often require high accuracy monitoring [7].

This paper presents the results of grid connection works (including simulation of load curves) of ALBA NOVA 1, an innovative solar thermal power plant located in the island of Corsica and equipped with Linear Fresnel CSP technology. It shows how CSP technology can uniquely and easily be applied in insular conditions with strigent grid requirements. In Corsica, the electricity distribution grid is managed by *Électricité de France* which carries out the studies for the connection of renewable power plants: at the present time, the capacity to integrate on the grid new renewable power is limited at 30 % for the intermittent renewable energy sources in the total energy mix of the island. Over this limit, EDF SEI is allowed to disconnect intermittent energy sources progressively from the most recently commissioned power plant to the older [8]. By understanding that operating conditions of CSP plants are very similar with the condition of a conventional thermal power plant, Corsica's TSO has enabled ALBA NOVA 1 to become one of the first significant renewable power plant supporting the grid during the peak load hours with a safe and an environment friendly thermal storage. Through a the simulation of load curve production of ALBA NOVA 1 and analysis from the Corsica grid configuration, the paper presents how a CSP plant can be a secure and predictable energy source for insular grids and an enabler for more renewable energy in the island's energy mix.