Feasibility Study of Smart Monofloat Hydrokinetic Power for the Rural Households in Naga Hammadi, Egypt

Fahd Diab, Hai Lan

Abstract:

Hybrid Renewable Energy System (HRES) is an attractive system for stand-alone electrification in remote areas. The hydrokinetic power avoids all the disadvantages of hydropower, unlike dams that have obstructed the natural water flow and ended up displacing animals and people. The main objective of this work is to provide a feasibility study of using SMART MONOFLOAT** hydrokinetic power in hybrid photovoltaic (PV)/HKT/diesel/battery system to satisfy the electrical energy needs for the selected rural households in Naga Hammadi, Egypt in this study. The SMART MONOFLOAT hydrokinetic turbine has been used as it was developed to produce a maximum amount of electrical power with the kinetic energy of flowing water. The well-known Hybrid Optimization of Multiple Electric Renewables (HOMER) software is used as a software tool in this study. The 22-year monthly average solar radiation data of the selected rural households in Naga Hammadi, located at latitude of 26.013 and longitude of 32.32 was obtained from National Aeronautics and Space Administration (NASA) database. The monthly average current velocity data in this study, was collected for a single year during 1991 after the construction of the Aswan Dam in 1904. According to the simulation results in this work, it was found that the optimum HRES consisting of; 90 kW of PV panels, 90 kW of HKTs, 22 kW of diesel generators, 60 kW of power converters and 225 batteries. In addition to, a great reduction in greenhouse gases emission during the project lifetime could be achieved in the optimum system.

Published In: