

Conceptual hybrid energy model for different power potential scales

This research attempts to address the gap between the theoretical fundamentals of hybrid renewable energy systems and their practical implementation at different scales through a new Conceptual Hybrid Energy Model (COHYBEM). The main objective was to develop a multi-variable model to allow a new complete and comprehensive techno-economic analysis of the performance of possible hybrid renewable power systems at different scales. The purpose is to evaluate the influence of critical parameters by changing key parameters in the developed model and identifying their impacts. It covers big data analyses, simulation, and optimization of hybrid energy solutions, combining wind, solar, and hydropower energy sources with the energy storage technology of pump hydropower storage. The research also denoted the Pareto front with the increasing power installed, for the maximum efficiency and total satisfied demand by Wind + PVSolar and by Hydro converges to a higher percentage, while a minimum waste by Wind + PVSolar is also progressing towards the increasing scales.