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Techno-Economic Analysis Hybrid Wind and Solar Energy Systems: A Case Study of District Sanghar, Pakistan

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Abstract—In this research, off-grid renewable energy system is deployed to replace fossil fuel resources to overcome environmental pollution & consumption of electric power by using Homer simulator for the location Shafiabad, District Sanghar. There are different parameters including NPC and COE are considered. This study observed that the hybrid system based on solar PV and Wind is the most low-cost to meet the Peak demand of 6.94 MW and most optimal configuration for practical aspects. The cost of electricity of the photovoltaic module-off grid system is around RS.8.78/kWh. The total net present cost at the invested value is around Rs-558 Million and the starting capital investment of RS-478Million. It is analyzed that, which 6071 kW solar and 3609 kW of converter were optimized from the total generated power. HOMER software is used for analyzing the techno- economic assessment for this study. The data regarding household and renewable resources are required for simulation of results and cost of electricity, greenhouse gas emissions and Net Present Value are considered as a key parameter. The solar PV and Wind are considered as a renewable resource for the selected location.

Keywords—Cost of Electricity, HOMER, NPC, Optimization, Sensitivity Analysis