

Techno-Economic Comparative Analysis of Grid Connected Solar Photovoltaic (PV) to Solar Concentrated Solar Power (CSP) for Developing Countries: A Case Study of Kenya and Zimbabwe

Authors : Kathy Mwendu Kiema, Remember Samu, Murat Fahrioglu

Abstract : The potential of power generation from solar resources has been established as being robust in sub Saharan Africa. Consequently many governments in the region have encouraged the exploitation of this resource through, inter alia direct funding, subsidies and legislation (such as feed in tariffs). Through a case study of Kenya and Zimbabwe it is illustrated that a good deal of proposed grid connected solar power projects and related feed in tariffs have failed to take into account key economic and technical considerations in the selection of solar technologies to be implemented. This paper therefore presents a comparison between concentrated solar power (CSP) and solar photovoltaic (PV) to assess which technology is better suited to meet the energy demand for a given set of prevailing conditions. The evaluation criteria employed is levelized cost of electricity (LCOE), net present value (NPV) and plant capacity factor. The outcome is therefore a guide to aid policy makers and project developers in choosing between CSP and PV given certain solar irradiance values, planned nominal plant capacity, availability of water resource and a consideration of whether or not the power plant is intended to compete with existing technologies, primarily fossil fuel powered, in meeting the peak load.

Keywords : capacity factor, peak load, solar PV, solar CSP

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