

Integration of Hydropower and Solar Photovoltaic Generation into Distribution System: Case of South Sudan

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Abstract : Hydropower and solar photovoltaic (PV) generation are crucial in sustainability and transitioning from fossil fuel to clean energy. Integrating renewable energy sources such as hydropower and solar photovoltaic (PV) into the distributed networks contributes to achieving energy balance, pollution mitigation, and cost reduction. Frequent power outages and a lack of load reliability characterize the current South Sudan electricity distribution system. The country's electricity demand is 300MW; however, the installed capacity is around 212.4M. Insufficient funds to build new electricity facilities and expand generation are the reasons for the gap in installed capacity. The South Sudan Ministry of Energy and Dams gave a contract to an Egyptian Elsewedy Electric Company that completed the construction of a solar PV plant in 2023. The plant has a 35 MWh battery storage and 20 MW solar PV system capacity. The construction of Juba Solar PV Park started in 2022 to increase the current installed capacity in Juba City to 53 MW. The plant will begin serving 59000 residents in Juba and save 10,886.2t of carbon dioxide (CO₂) annually.

Keywords : renewable energy, hydropower, solar energy, photovoltaic, South Sudan

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