Forecasting Large Scale Solar Photovoltaic Power Generation In Nigeria Using Machine Learning Tool

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Abstract: Energy sustainability have been the quest of Nigeria to improve the power generation for renewal energy source due to the increasing energy demand for economy developmentand environmental challenges in the country associated with the cost of producing electricity due to privatization of the power holding company of Nigeria (PHCN], 2013 led to the energy crisis in the county with price rise, shortage in power supply of energy and environmental pollution from hydrocarbon known as fossil fuel. The aim of this research paper is to improve the accuracy and reliability of solarphotovotaic (SPV) power generation forecasts in four regions of Nigeria using machine learning tools. The application of machine learning tools to solarphotovotaic [spv] power generation was done in Sokoto, Northern Nigeria, Anambra, Eastern Nigeria, Port-Harcourt Southern Nigeria, and Lagos, Western Nigeria. These were forecasted through the climate weather change of the country, were solar irradiationand cloud cover. Parameters for these four regions of the country were applied as simulation imputes to activate the machine learning tools for forecasting the power generation in northern Nigerian, southern Nigerian, western Nigeria and eastern Nigeria. The Nigeria solar power generation from 2010 to 2020 result collection of Sokoto, has compared to power plant capacity located in the other parts of the country. With power generation 0f 593mwhr/yr. from Sokoto Northern Nigerian, 260mwhr/yr. from Anambra eastern Nigeria, 220mwhr/yr. Lagos western Nigeria and 210mwhr/yr. from Port-Harcourt southern Nigeria. Analyze the potential of forecasting solar power plant in Nigeria, assessing the available data and developing appropriate machine learning models to provide liable information for power system optimization and investment decision – making for large scale solarphotovotaic power generation by economic analysis also proved that cost of 200kw solar photovotaic power generation plant in Port-Harcourt, Lagos, Anambra, has higher cost of production than power generation plant located in Sokoto because Sokoto have preferable weather condition performance in solar panel than others. Therefore economic analysis of large scale solar photovotaic power generation plant has been made and 4 x250kw model mini grid systemswere developed.

Keywords: Forecasting weather parameters, large scale solar photovotaic, power generation plant, machine learning tools, mini grid model.