

Enhancing Nigeria's Power Grid Performance through a Hybrid Transmission Network.

Omowumi G. Olasunkanmi¹, ²Michael R. Adu, and ³Waliu O. Apena.

¹Department of Electrical/Electronic Engineering, College of Engineering and Environmental Studies, Faculty of Engineering, Olabisi Onabanjo University, Ago-Iwoye, Ogun State Nigeria. ^{2,3}Department of Electrical/Electronic Engineering, School of Engineering, Federal University of Technology, Akure, Ondo State, Nigeria.

Abstract

The Nigerian power demand is increasing and the existing power grid has proved over-time to be ineffective in meeting up with the increase. The transmission losses experienced on the grid account for a greater part of its problem. The hybrid setting (that is, integrating High Voltage Direct Current (HVDC) transmission lines) was proposed in this work. In the hybrid system, six existing transmission lines representing twenty-nine per cent (29%) of the total lengths of the transmission lines on the existing grid were converted to HVDC lines. Converter stations were introduced at the sending and receiving ends of the lines in the hybrid model. The modelling and simulation of the existing grid was done on Matlab/Simulink while that of the hybrid system was also carried out. The load flow results showed the voltage and load consumption profiles. The total loss on the existing network was 438.1MW while that of the hybrid just added up to 104 MW, the efficiency recorded were 91% and 97% respectively. The results presented the hybrid setting as a better option as improved voltage level was experienced and the losses were drastically reduced.

Keywords: Grid, High Voltage Direct Current, Hybrid, Simulink, Transmission losses

Email: grace.olasunkanmi@oouagoiwoye.edu.ng; +2347060406470.

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