Reinforcing Kenya Power National Grid Using Statcom Devices

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Abstract

Modern power system is a complex network comprising of numerous distributed generators, transmission lines, switchgears, distribution network and variety of loads. Due to the recent increase of connected load as a result of Government of Kenya and Kenya Power initiative projects such as last mile, Global Partnership On Output Based Aid (GPOBA), and school electrification, transmission lines and primary substations are getting more loaded than they were initially designed. Further, the quality of the power supplied to the end users is deteriorating as network expand due to inherent system disturbances such as voltage dips, harmonic distortions and phase angle deviations caused by low voltage network faults. This has resulted to high level of customers’ dissatisfaction and complains. Research has shown that over 60% of system perturbations are caused by natural events such as lightning strikes and system faults. There are various methods power utilities are employing to realize a robust and reliable power transmission system. Such methods include re-conducting of transmission lines, construction of new transmission lines and in recent time installation of Flexible AC transmission system (FACTs) devices. The FACTS are power electronic devices that have ability of controlling the network voltage condition both in steady and transient state of complex power system. The most common power electronic controllers are, Dynamic voltage stabilizer (DVS), Static Synchronous Compensators (STATCOM), shunt compensators and Unified power flow controller (UPFC). The STATCOM devices are the most widely installed power electronic controllers as they provide excellent performance in stabilizing the power system both in steady state and non-steady state (system disturbances) conditions. It is for this reason the author propose installation of STATCOMs to reinforce the Kenya Power national power grid to achieve a robust and resilience system which improves the power quality supplied to the end users.

Keywords: FACTS, STATCOM, Power utility, Power quality.