

**Title:****Comparison of Bus Voltage Configurations for a Residential Wind/PV/Battery Hybrid System Architectures****Aysar Yasin**

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**Authors:****Abstract:**

This paper investigates the selection of optimal internal configuration of a stand-alone hybrid power system based on photovoltaic generator (PVG), wind energy generator (WEG) and battery storage system (BSS).

The configurations include high voltage DC bus (HVDC), low voltage DC bus (LVDC) and high voltage AC bus (HVAC).

Dynamic models are designed in MatLab/Simulink/SimPowerSys™ environment in order to study and compare the performance of each configuration. To this purpose some performance indexes are considered, such as: the global efficiency, fraction of energy driven from battery storage system to cover the load demand and fraction of energy delivered to battery storage system from renewable energy sources.

The global efficiency of HVDC bus configuration is found the best while the global efficiency of LVDC bus configurations is the lowest. The fraction of energy required from battery energy system is the lowest in LVDC while the HVAC is the highest. The fraction of energy driven to battery energy system in LVDC bus configuration is the highest among the other configurations.

Sensitivity of performance indexes to seasonal load variation is investigated using three patterns of load profiles.

**Keywords:** Hybrid System, PhotoVoltaic Generator (PVG), Wind Energy Generator (WEG), Battery storage system (BSS), Stand-alone configurations.