Abstract

Nanogrid is a branch of a microgrid that distributes power to residential homes or buildings by sustainable energy sources. DC Nanogrid has characterized as the structure of DC Low voltage distribution. The residential DC home appliances user expands with advanced power electronics technology because most of the power generation produces DC energy from renewable energy sources without the effect of environmental hazards. A lot of renewable energy sources are organized into the power grid which is more popular because most of the home appliances depend on renewable energy sources for environmentally friendly. So, Home appliances are sifted to future energy.

The purpose of this study is DC nanogrid is a promising trend because of home appliances in the future tend to be shifted to use DC energy. So, different kinds of loss have happened in the energy distribution system. In this case, DC Home Appliances (HA) create many conversion loss by multi-level voltage HA in DC home. In DC nanogrid, the minimize of energy conversion loss is one of the most important issues for the DC Home Energy Management which is occurred by Direct Current to Direct current conversion of multi-level voltage in residential households for the DC Home Energy Management System (DC-HEMS) that need to be concerned.

So, to solve these significant issue, it is necessary to analyze energy distribution parameter residents activities, energy conversion devices, Battery energy storage system (ESS), Solar Photovoltaic (PV) System, Fuel Cell (FC) System, DC to DC converter, and Home Appliances Management System (HAMS), power distribution energy conversion loss and so on. In this

thesis, I do a study of PV System, FC System, DC to DC converter efficiency, minimum energy conversion loss.

The implementation of a novel 4-level DC Home Energy Management System (DC-HEMS) scheme has considered the DC-DC conversion loss and the efficiency of the system by adding another low voltage conversion level to reduce the conversion loss. As a result, it is more tolerant of the energy distribution system and establishes a significant impact on the residential home or building power distribution system for minimum energy conversion loss and minimum electricity cost for Nanogrid.

The simulation results show that this proposed model provides 96% efficient energy conversion and 16.83% more efficient compared to another multi-level voltage conversion system.n this thesis, we do a study of PV System, FC System, DC to DC converter efficiency, minimum energy conversion loss .4 Level DC Home Energy Management System (4LDC-HEMS) scheme of home appliances for Naongrid.This study will be solved the significant problem based on DC HEMS by the Matlab simulation with human activities and real experimental data from iHouse.

Keywords: Solar Photovoltaic (PV), System, Fuel Cell (FC) System, Battery energy storage system (ESS), 4 Level DC (4LDC), DC Home Energy Management System (DC-HEMS), Energy conversion loss, Nanogrid