A Review on Microgrid System

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Abstract- *Power systems are undergoing considerable change in operating distributed generation based on wind, solar energy, biomass, micro turbines will plays attractive role both for on grid and off grid system. This paper includes the linking of AC grids with DC grids which make the profit of both the grids. The idea is to drive the both AC as well as DC loads from more than one renewable sources like solar panels, wind plant etc. like other microgrids the AC-DC microgrid can operate either in grid connected or in islanding modes. For operates system under island mode, a coordinated strategy for the battery system, wind turbines are proposed. The modeling and simulation of AC-DC microgrid along with hybrid converter are done using MATLAB/SIMULINK.*

Key Words: DC Microgrid, Renewable energy source, Storage system.

1. INTRODUCTION

Renewable energy storage proposes a new technology that is clear and capable of supplying an electricity demand. A solar microgrid is a small-scale powered grid that can operate independently to supply energy for consumers. A solar microgrid generally consist of a solar PV array, a battery bank, charge controller or control system, inverter, cables for power distribution and safety devices.

Size of a microgrid system depends on the number of consumers and corresponding energy demands. Capacity of a microgrid system can be a small as 100W to supply basic lighting loads for few adjacent households or even more than 100KW to supply residential and commercial loads.

It Consist of four parts:
 1. Distribution system
 2. Distributed generation sources (DG)
 3. Energy storage (ES)
 4. Controllers and loads

In microgrid the DC power is generated with the help of energy sources. Before supplying to the load power is stored in the storage devices like battery. Hybrid converter is a device which gives AC as well as DC output from a single DC input. With the help of hybrid converter both AC as well as DC load will drive. Microgrids serve industries, institutions, communities and other customers in a range of ways.

The objectives of this paper are to proposed DC microgrid to controls onsite generation and power demand to meet the objectives of providing power and injecting power into the utility grid if required. The microgrid controller becomes essential for balancing power and load management.

2. MAIN COMPONENTS

DC microgrid system, which is composed of power sub-system and energy supervision system. In the power subsystem, PV array, electrolytic storage and utility grid supply the load through their dedicated converters. A common dc bus couples them. In most of the cases, PV source is controlled by a maximum power point tracking (MPPT) algorithm, but is able to output a constrained power as well.

1] PV ARRAY (PHOTOVOLTAIC ARRAY)

Solar-photovoltaic technology is one of the distributed renewable energy resources in the microgrid. The PV array is charged through the sun radiations and it generates the fluctuate power. There are mainly three type of solar panels are available in market like, monocrystalline, polycrystalline and thin film. Monocrystalline panel is more efficient than other so here this type of solar panel used. Monocrystalline panels are generally constructed from high quality silicon cell. The different types of PV module vary significantly by cost, efficiency and sppearance.

As microgrids are used on large platform so for fulfill the increasing demand the panels should have a rating in KW or in MW. The choice is highly dependent on the application.

2] WIND PLANT

In wind turbine, power of wind is converted into electrical power that can be done by using various generators. In this case, we have used PMSG (permanent magnet synchronous generator) to convert wind power into electrical power and by using Buck converter, generated power is converted into DC power to make micro-grid a common DC Grid.

The main advantage of the surface-mounted SG (synchronous generator) is its simplicity and low construction cost in comparison to the inset PMSG. However, the magnets are subject to centrifugal forces that can cause their detachment from the rotor and therefore the surface-mounted PMSGs are mainly used in low-speed applications. In a direct-driven WECS (wind energy conversion system), the synchronous generator with a high number of poles is used. The surface-mounted PMSG can have an external rotor in which the permanent magnets are attached to the inner surface of the rotor.

3] CHARGE CONTROLLER

Battery charge regulation and control of the energy produced by the PV array is a critical function in PV systems. Conventional solar plant converts only 30 to 40 percent of the solar irradiance into electrical power. Maximum Power Point Tracking (MPPT) helps to improve the efficiency of solar panel. By maximum Power transfer theorem, the power output of circuit is maximum when the Thevenin impedance of the circuit matches with the load impedance. Due to this by matching impedance maximum power of solar panel is achieved. For matching impedance, buck converter is used to match source impedance with load impedance and also for enhancing the output voltage.

4] STORAGE DEVICE

In the stand alone PV system, battery storage is required is required if electrical loads arerequired to operate at night time, or during extended periods of cloudy or overcast weather when the PV array by itself cannot supply enough power. The primary functions of a storage battery in a PV system are voltage stabilization and supply surge currents.

In general, electrical storage batteries are broadly classified as primary and secondary batteries. Primary batteries are not used in the PV system because they cannot be recharged. A secondary battery can store and deliver electrical energy and can also be recharged by passing a current through it in an opposite direction to the discharge current.

5] HYBRID CONVERTER

Hybrid converter can supply simultaneously AC as well as DC from a single DC source. The hybrid converter is derived from the single switch controlled boost converter by replacing the controlled switch with voltage source inverter (VSI). Hybrid converter has the advantages like reduced number of switches as compared with conventional design and provides DC as well as AC outputs with an increased reliability resulting from the inherent shoot through protection in the inverter stage

Hybrid converter has higher power processing capability and improved reliability.

3. CONCLUSION

Microgrid is an extension of main grid providing on-site generation capable of fulfilling its load demand. A DC microgrid for non-conventional power integration has been proposed. Its functioning was demonstrated through simulation. A storage battery is used to quantify the uncertainty affiliated with the forecast of aggregated wind and PV based power generation was created. It plays a critical role in compensating renewable power fluctuation and providing the power needed when solar and wind stops. It is concluding that microgrid is added with main grid to increase reliability, improve power quality. The microgrid is used in islanded or grid connected modes.

4. REFERENCE

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