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Hybrid power management in paper mill

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ABSTRACT

Solar energy is one of the most available renewable energy source, little research has been done on operating solar and thermal energy sources alongside one another in order to take advantage of their complementary characters. In this paper, we develop an optimal design for a hybrid power management in paper mill, where the variables that are optimized over include the number of photovoltaic modules, analysis reveal that the hybrid plant is able to exploit the complementary nature of the two energy sources, and deliver energy reliably throughout the year.

INTRODUCTION

In SPB paper mill, power is generated by steam generator and steam is produced by burning of coal. SPB paper mill's total electric energy demand is 25MW and they meet out their requirement by two steam turbo generators 20MW and 16MW power. TNEB grid is stand by source of supply and they have drawn power from TNEB during breakdown of any one of the generators. In this process, a thermal power plant is steam driven. Water is heated, turns into steam and spins a steam turbine which drives an electrical alternator. After it passes through the turbine, some portion of the steam is condensed and recycled to where it was heated this is known as Rankine cycle. Remaining portion of steam is used in paper making process. The greatest variation in the design of thermal power station is due to the different fossil fuel resources generally used to heat the water. Some prefer to use the term energy center because such facilities convert forms of heat energy into electrical energy. Thermal power plants produce a large part of man-made CO2 emissions to the atmosphere. C02 gets emitted to the atmosphere which causes environmental pollution. To overcome this problem, we are hybriding the current system with the solar photovoltaic cell (PV) which is not used by SPB at present.

EXISTING SYSTEM

Two generators are always in parallel condition which supplies total demand. Whenever any one of the generators has failed, another generator is made paralleled with TNEB and power is imported from TNEB. Coal is main raw material for boiler from which steam is produced. steam drives the turbine.

DISADVANTAGES

It uses large amount of coal. It creates demand for coal which is a non-renewable energy. Also this method is costly.

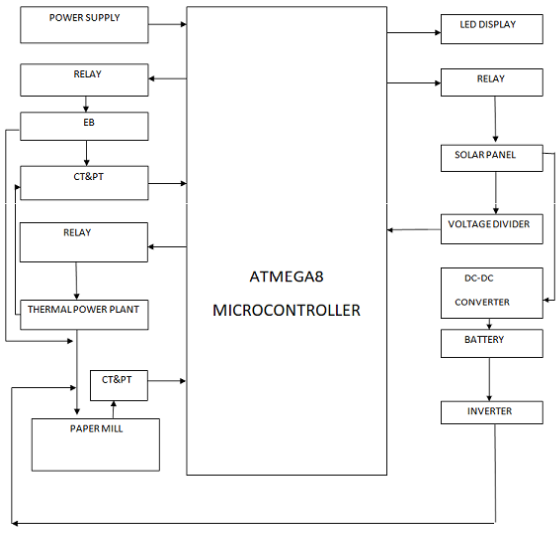
PROPOSED METHOD

In proposed system, hybrid source from solar energy and thermal power plant is used. In this system by using combination of solar energy and thermal plant the required amount of power supply can be generated easily.

ADVANTAGES

It is so much economical than the existing system. Power consumption from electricity board is decreased. Power generation using renewable source reduces the coal usage. By reducing the usage of coal, the CO emission gets reduced.

BLOCK DIAGRAM



DESCRIPTION

The source from the thermal power plant and the current from solar energy is measured by current transformer and passed through voltage sensor. Then the required amount of voltage from both the sources is passed into the arduino and the remaining voltage is stored in battery.

APPLICATION

Hybrid power generation is suitable for all industries such as steel industries, cement industries, textile industries, etc..

BASE PAPER

1. Published **in:** IEEE Transactions on Sustainable Energy (Volume: 3, Issue: 3, July 2012)

Pages:422-431

The paper presents a microcontroller-based power management system (PMS) designed for the online operation of an experimental low voltage microgrid equipped with a battery storage system and two power supplies: a kilowatt (kW)-class proton exchange membrane (PEM) fuel cell (FC) and a photo-voltaic (PV) module emulator, both connected to a low voltage ac node. The connections of the energy sources to the common ac bus make use of power inverters with specific functionalities. The ac node feeds electric active and reactive load emulators able to reproduce programmable profiles. The automatic PMS provides the microgrid monitoring and the FC power scheduling in both grid-connected and islanded operating conditions. The paper describes the structure and functionalities of the PMS as well as a specific experimental investigation aimed

at assessing the dynamic performance of the microgrid in islanded conditions.

2. **Published in:** Power Engineering Society General Meeting, 2006. IEEE

Date of Conference: 18-22 June 2006
Photovoltaic (PV) solar energy systems are widely used as an important alternative energy source. To overcome the problem of intermittent power generation, PV power systems may be integrated with other power sources. Fuel cells are an attractive option because of high efficiency, modularity and fuel flexibility; however, one main week point is their slow dynamics. On the other hand, current technology batteries by themselves are usually insufficient to provide the long-term energy that the increasing loads require. Hybrid systems composed of fuel cells and batteries can be integrated with PV power systems to provide uninterrupted high-quality power. The goal of this study is to design an effective power management system for a PV/fuel cell/battery hybrid power system so that the combination can be used as a reliable power source. In this paper, the structure of the hybrid power system is described, and control strategies for power management of the hybrid power system are discussed. The proposed hybrid power system is then verified by numerical simulation.

3. **Published in:** Innovations in Information, Embedded and Communication Systems (ICIIECS), 2015 International Conference on

Date of Conference: 19-20 March 2015

Promotion of distributed renewable energy sources is an economical off grid energy solution for remote locations providing both social and environmental advantages. Integration of different types of renewable energy sources presents challenge in terms of their power management, control & stability. This paper presents power management of microgrid comprising of wind, microturbine as the sources, Battery energy storage system as stabilizer along with AC/DC load network connected by bidirectional converter. Control strategy and energy management of distributed sources is proposed for achieving smooth transfer of power and stable operation of system. Hybrid system consist of wind, Microturbine generator system and storage system is modeled and simulated using MATLAB/SIMULINK® for different load and source variation scenarios. The simulation results shows that the system can maintain stable operation under the proposed method of control under varying conditions and also when the system is switched between autonomous and grid-tied modes maintaining voltage and frequency within limits.

APPLICATIONS

Hybrid power generation is suitable for all industries such as steel industries, cement industries, textile industries, etc..

CONCLUSION

Through our project we can satisfy the power demand of paper mill by supplying power through hybrid of solar with thermal energy.By reducing the running time of thermal power plants to a large extent we can reduce environmental pollution.

REFERENCES:

1.https://en.wikipedia.org/wiki/Hybrid_renewable_energy_system

2.https://www.eniday.com/en/technology_en/hybrid-power-plants/

3. http://www.engpaper.com/solar-power-management.htm

4. http://ieeexplore.ieee.org/document/5542695/

5. http://ieeexplore.ieee.org/document/7193231/

6.https://www.windurance.com/hybrid-power-management-system/

7.http://techportal.eere.energy.gov/technology.do/techID=35

8.https://www.researchgate.net/publication/241638715_A_MicrocontrollerBased_Power_Management_System_for_Standalone_Microgrids_With_Hybrid_Power_Supply