A Brief Review In Solar and Wind Power Applications

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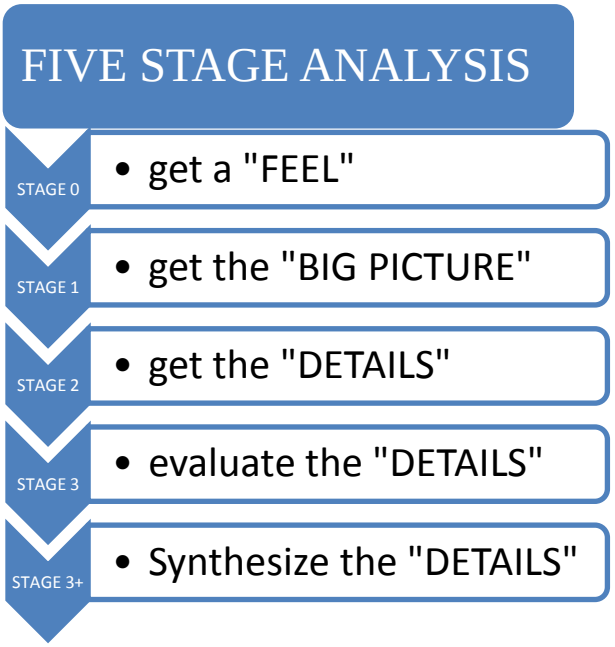
ABSTRACT

There is increasing demand for the use of alternate or renewable energy sources to achieve clean and low-cost electricity. The potential for non-thermal onsite power generation also remains enormous in India with increasing investment in small-scale solar and wind power. Design & integration of renewable energy hybrid system also involves the process of selecting the best components and its sizing to provide cheap, efficient, reliable and cost effective renewable energy. Grid power availability is very poor and use of Diesel generator is very expensive due to its fuel and transportation cost as well as maintenance. This paper gives the design idea of optimized pv- solar and wind hybrid different applications. This paper presents a detailed reviews process adopted to study a scientific research papers. It explains five stage process followed for the review of 3 selected papers in the area of renewable energy system replacing Systems with Conventional Energy sources.

INTRODUCTION

In recent times India is the world's second largest subscriber base of 700 million and it may be come to 800 million in next 2 years. However lack of stable grid power in rural India face a big challenge to this phenomenal growth. Some areas may get agricultural power for 4-5 hours during morning and evening; during remaining period diesel generator provides power. Cell sites running on DG is very expensive due to its fuel, transportation of fuel and maintenance cost. So a sustainable alternative to power remote base station sites is to use renewable sources. In order to meet load demands of mobile base station during varying natural conditions, different energy sources (solar-wind), battery bank and converters need to be integrated with each other for extended usage of alternative energy. Based on the energy consumption of mobile base station and the availability of renewable energy sources, it was decided to implement an innovative stand alone Hybrid Energy System combining small wind turbine-generator, solar photo-voltaic panels, battery storage, advance power electronic equipment and existing diesel generators. The system architecture employed in the hybrid system is AC Coupled where the renewable energy sources and conventional diesel generator all feed in to the AC sides of the network.

REVIEW PROCESS ADAPTED



LIST OF PAPER REVIEWED

AUTHOR	YEAR	TITTLE	PUBLISHER
Sthitaprajna Rath *et-al*	2012	Strategic Approach of Hybrid Solar-Wind Power for Remote Telecommunication Sites in INDIA	International Journal of Scientific & Engineering Research
Yandra Shivrath *et-al*	2012	Design & Integration of Wind-Solar Hybrid Energy System for Drip Irrigation Pumping Application	International Journal Of Modern Engineering Reasearch (Ijmer)
K.V. Santhosh *et-al*	2012	An Intelligent Solar Powered Street Light	International Conference on Computing and Control Engineering

VARIOUS ISSUES

1. Lack of stable grid power in rural areas.
2. Cell sites running on DG is very expensive due to its fuel, transportation of fuel and maintenance cost.
3. Electricity for agricultural water pumping requirements.
4. Energy saving in street lights.

SUMMARY (issue 1,2)

The author has presented a solution to meet the load demand of mobile station by using solar wind hybrid renewable energy setup minimizing the use of DG (diesel generators) because of the very poor availability of grid power and expensive transportation cost and maintenance cost of DG. By integrating and optimizing the solar photovoltaic and wind systems, the reliability of the systems improved and the unit cost of power minimized as well as it gave the continuous 4.75 KW power to telephony system. The DG set up as back up only operate for only emergencies or in cloudy days when solar power not available. The meteorological data of solar isolation, hourly wind speed taken for Odisha in India and the output power for hybrid energy system was found by using MAT LAB software. Based on the energy consumption of mobile base station and the availability of renewable energy sources, it was decided to implement an innovative stand alone Hybrid Energy System combining small wind turbine-generator, solar photo-voltaic panels, battery storage, advance power electronic equipment and existing diesel generators.

Before when hybrid power was not installed DG consumed diesel 16,350 litter with cost 6,54,440/-per year. After installation of hybrid power DG consumed diesel 2721.6 litter with cost 1,08,864/-per year if it will run 4 hour per day. The fuel consumption is also reduced to approximate 80% with increasing oil prices, payback times on the investment to hybrid solar-wind powered base station sites are continuously decreasing. Considering operating cost and maintenance cost, an autonomous site powered by wind solar hybrid system pay-off after 2-4 years in a good sunny and windy location. The Base stations powered by the solar wind hybrid energy system with diesel backup – are proving to be the most environmentally friendly and cost effective solutions for many challenging sites. Operating and maintenance costs are extremely low, making it economical to extend cellular coverage in far-flung regions.

SUMMARY (issue 3)

The author has presented a solution to meet the load demand of drip irrigation pumping application by using solar wind hybrid renewable energy setup minimizing the use of Electricity for agricultural water pumping requirements.

The specifications of a hybrid system are derived from a comprehensive understanding of the pumping requirements of the drip irrigation system. Research & development has been carried out to design & develop an integrated and sustainable renewable energy system that supplies electricity to a submersible pump that would cultivate a land of 1.5 acres of mango crop located at Dr.B.V.Raju Institute of Technology, Narsapur, A.P, India Submersible pumps are easy to install, have no suction problem, and require no water level guard. Submersible Pump is selected based on the below factors:

- Source of water (well, river, pond, etc.)
- Required pumping flow rate
- Total suction head
- Total dynamic head

Solar-Wind Hybrid Systems is the best feasible economic solutions for lowering electricity bills, also they help in avoiding the high costs of extending utility power lines to remote locations, prevent power interruptions, and provide a non-polluting source of electricity

The major advantage of wind–solar hybrid energy system is that when used together, the reliability of the system is enhanced. Additionally, the size of battery storage can be reduced. Remote communities which cannot be reached by electricity grids, except at prohibitive costs, or which do not have easy access to conventional commercial fuels, can easily adopt these hybrid systems for irrigation.

SUMMARY (issue 4)

The author in this paper aims to design an intelligent solar powered street light using the fuzzy logic algorithm. The switching of street light is controlled based on the intensity of the light available. The control action is designed using the fuzzy logic algorithms considering the environmental temperature. The whole system is powered using the solar panel. The street light operations are controlled in three modes (i) day mode, (ii) dusk mode and (iii) night mode. In day mode the street light will not switch on and solar panel absorb energy from sunlight and store it in battery. During dusk mode the street light is on with full intensity. During the night mode the illumination is minimum when no inhabitants are using the road and when the people are using the road the intensity is increased. The control of switching is completely automatic and controlled using fuzzy algorithms.

A temperature sensor is also used as secondary sensor. Since, the proposed work controls the streetlight based on the utility making the efficient utilization of energy. Thus, the present intelligent solar powered street light saves the energy which is very vital in this energy crisis world. The night mode was conceptualized. This mode will be activated when the air temperature and the light intensity has reduced to a lower level. During this mode the IR motion sensors will be activated. The principles are very simple. It consists of just two components. The first is an Infra-Red (IR) transmitter (usually an LED), while the second is an Infra-Red receiver (usually a transistor). IR is transmitted out of the sensor unit. If the IR is reflected back, it is picked up by the IR receiver transistor. The heat from the sun is predominantly in the IR part of the spectrum. When the sensor is over a black line, no IR is reflected back to the receiver. If the sensor strays away from the line, then IR is reflected back. The two motion sensors will be placed at the ends of the street whose lights are controlled by the microcontroller. When a vehicle or a pedestrian cuts the IR beam, the microcontroller generates a signal. This signal is transmitted to the receiver causing the street light to switch ON. This receiver on receiving the signal causes all the lights to switch ON. Else then this vehicle or pedestrian cuts the IR beam on the other end, a signal is again generated to reduce the intensity of street light. In case of any emergencies a manual override is provided to switch ON or OFF and control the operations of street lights.

LIMITATIONS

Paper1.

The data carried our was for a particular site in orisa India.

Paper2.

Avalability of wind is not sufficient at every place.so the system can be adopted in only rich windy areas.

Paper3.

There is no feeback in case of failure or the working hardware. So intelligence of system lacks.

CONCLUSION

We have selected 3 paper in this particular area and carried out an exhustive review and reached to the conclusion that the renewable energy sources are very good otion to replace the conventional energy sources as well as the are money savinig and enviornment friendly techniques.

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