

HYBRID POWER GENERATION SYSTEM

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ABSTRACT

Due to limit of use of conventional energy sources, these days emphasis is given on to the use of non-conventional sources like wind energy. Though to use this form of energy for today's machinery. In simple construction a vertical axis wind mill is constructed instead of it being rest on a thrust bearing it is levitated in air using magnetic property of same pole repelling each other. One magnet is fitted into the wind mill while the other is fitted in to the hoist. Generator is coupled with is wind mill thereby generating the electricity efficiently and at a larger capacity. The electricity generated from this type of wind mill is also very large compared to the conventional wind mills. Wind energy turbines are not that kind of efficient to produce continues & sufficient power so that, to overcome the problem associated with conventional turbines we are introduces to make hybrid electricity generation system along with Solar panel as a new breed being developed. This has motivated for hybrid power generation. The project deals with the study and design of hybrid system of solar and wind energy for rural area's applications.

Keyword : - Solar, wind, hybrid power, higher electrical output

1. INTRODUCTION

Hybrid Renewable Energy Systems (HRES) are becoming popular as stand-alone power systems for providing electricity in remote areas due to advances in renewable energy technologies and subsequent rise in prices of petroleum products. A hybrid energy system, or hybrid power, usually consists of two or more renewable energy sources used together to provide increased system efficiency as well as greater balance in energy supply. Most of us already know how a solar/wind power generating system works, all these generating systems have some or the other drawbacks (considering standalone system), like Solar panels are too costly and the production cost of power by using them is generally higher than the conventional process, it is not available in the night or cloudy days. Similarly Wind turbines can't operate in high or low wind speeds. Solar hybrid power systems are hybrid power systems that combine solar power from a photovoltaic system with another power generating energy source. This would create more output from the wind turbine during the winter, whereas during the summer, the solar panels would produce their peak output. Hybrid energy systems often yield greater economic and environmental returns than wind, solar, geothermal or tri-generation stand-alone systems by themselves.

The thermal power stations are causing pollution which severely affects mankind and nature. These power stations result in causing many diseases. Also natural resources like coal, oil, radio-active materials etc will get extinct in near future. The other existing power generating systems like Hydro-Electricity power generating plant cannot afford much power as it is season based, although it causes less pollution. Therefore, it is of great urgency to go for non-conventional energy resources

Our project is based on utilization of non-conventional sources of energy to satisfy basic. Energy demand like powering street lights using wind and solar energy. The purpose of using two sources of energy like wind and solar is to eliminate seasonal dependency of the instrument. When one source, say solar energy is not available in abundance during monsoon, wind energy comes to the rescue and similarly opposite will be the case during the time when the winds are not intense enough. Also it includes the analysis of the VAWT, so that max power and efficiency can be obtained.

1.1 Problem Statement

In some cases wind energy turbines or solar PV cells are not efficient to produce continues & sufficient power so that, to overcome the problem associated with conventional wind & solar power system, we are making hybrid electricity generation system along with Solar panel& wind mill. The project deals with the study and design of hybrid system of solar and wind energy for rural area's applications.

1.2 Objectives of Project

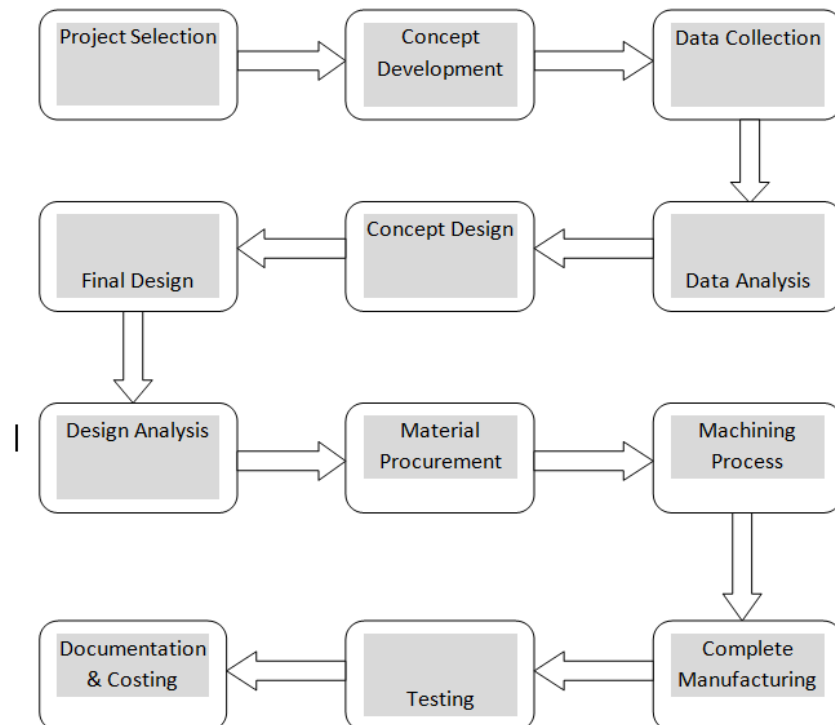
The main objective of this project is to assess the feasibility and economic viability of utilizing hybrid Solar– Wind– battery based standalone power supply systems to meet the load requirements.

- 1) To make nonconventional system which will give continues & sufficient power in all working conditions.
- 2) To make energy efficient hybrid power generation system as an low cost alternatives to conventional one.
- 3) To optimize usage of electricity by substituting its hybrid mode of generation.
- 4) To develop a small scale model for assessing feasibility of system.
- 5) To design the system this is cost effective, reliable and also efficient.
- 6) To carry out the performance analysis of hybrid power generation system the analysis of VAWT.

2. PROCESS FLOW AND METHODOLOGY

Methodology is the systematic. Theoretical analysis of the methods applied to a field of study or the theoretical analysis of the body of method and principles associated with a branch of study. The below flow chart shows the sequential operation/steps that will be performed during the project process.

Chart-1: Methodology



2.1 Literature Review

- 1) VaradBagwe, AbhijeetThoke, CharchitVatsa, DibyanshuPandey, SangeetaKotecha, done the work on ,Integration of Solar and Wind Energy System for Hybrid Power Generation, according to his study, With the increased global warming concern it is becoming important to find an alternative toconventional energy sources causing less pollution and leading to sustainable use of available resources. This has encouraged renewable energy generation to become a leader in energy sector but the main obstacle in its path is its cost effectiveness. This has motivated for combining two or more renewable energy resources i.e.hybrid power generation. The paper deals with the study and design of hybrid system of solar and wind energyfor rural area's electrification.A hybrid power generation system is better solution for power generation than conventional energyresources especially in rural areas where electricity is not stable or absent. The power generated can beutilized in situ thereby reducing transmission losses and cost. The designed hybrid system is very compact,easy to install and ensures no power failure by solar during the day and wind during the night. As the idea is inits initial stage, so productive changes may be implemented in later stages. It is highly safe for theenvironment having long life span and only need initial investment thus overall it is good, reliable andaffordable solution for electricity generation.[1]
- 2) Dr. RecayiPecen, Dr. MD Salim, & Dr. Marc Timmerman,done the work on , A Hybrid Solar-Wind Power Generation System as an Instructional Resource for Industrial Technology Students,according to his study,The detailed study of electricalpower systems is a key element of many curricula in Industrial Technology. A novel laboratory set-up has been designed and implemented at the University of Northern Iowa as an instructional resource for teaching electrical power system and renewable energy concepts. The set-up consists of a photo-voltaic solar-cell array, a mast mounted wind generator, lead-acid storage batteries, an inverter unit toconvert DC power to AC power,electrical lighting loads and electricalheating loads, several fuse and junction boxes and associated wiring, and test instruments for measuring voltages, currents, power factors, and harmonic contamination data throughout the system. This hybrid solar-wind power generating system is extensively used to illustrate electrical concepts in hands-on laboratories and demonstrations in the Industrial Technology curriculum. Obviously, a complete hybrid power system of this nature may be too expensive and too labor intensive for many Industrial Technology Departments.

However, many of the same benefits could be gleaned from having some subset of the system, for example a PV panel, batteries, and an inverter, or even just a PV panel and a DC motor. The enhancements to instruction, especially in making electrical power measurements more physical, intuitive, and real-world are substantial and the costs and labor involved in some adaptation of the ideas in this paper to a smaller scale setup are reasonable. The use of solar and wind hybrid power generation is an especially vivid and relevant choice for students of Industrial Technology in Iowa as these are power sources of technological, political, and economic importance in their state. In other places, other power sources could be used. For example hybrid combinations of wind power, solar power, geothermal power, hydroelectric power, tidal power, biomass generated power, power from incineration of solid wastes, and many other technologies could be considered depending on local interests andresources. The key elements of this test bed concept presented in this paper are two or more renewable power sources connected to a power grid with complex electrical interactions.

A computer measurement and control bus will be added to the system. Computer controlled relays will be added to allow all the major elements of the system to be switched in and out of the system through computer programs. The measurement bus will be connected to all the major signals in the system and will allow for computerized data acquisition simultaneously of all the major signals in the system. These improvements will allow for the study of more complex issues like power faults caused by sudden over voltageslike lightning. These improvements will also allow the same benefits to instruction realized in electricity and electronics classes to be extended to control and instrumentation classes.[2]

3)Swapneelkaurav, Prof.P.Yadav,done the work on ,Hybrid Power System Using Wind Energy andSolar Energy, according to his study, Now a day's electricity is most needed facility for the human being. All the conventional energyresources are depleting day by day. So we have to shift from conventional to non-conventional energy resources. In thisthe combination of two energy resources is takes place i.e. wind and solar energy. This process reviles the sustainableenergy resources without damaging the nature. We can give uninterrupted power by using hybrid energy system.Basically this system involves the integration of two energy system that will give continuous power. Solar panels areused for converting solar energy and wind turbines are used for converting wind energy into electricity. This electricalpower can utilize for various purpose.Generation of electricity will be takes place at affordable cost. This paper dealswith the generation of electricity by using two sources combine which leads to

generate electricity with affordable cost without damaging the nature balance. Hybrid power generation system is good and effective solution for power generation than conventional energy resources.

2.2 Working

Solar energy is energy from the Sun. It is renewable, inexhaustible and environmental pollution free. Solar charged battery systems provide power supply for complete 24 hours a day irrespective of bad weather. More so, power failures or power fluctuations due to service part of repair as the case may be is nonexistent. Wind is a natural phenomenon related to the movement of air masses caused primarily by the differential solar heating of the earth's surface. Seasonal variations in the energy received from the sun affect the strength and direction of the wind. The wind turbine captures the wind's kinetic energy in a rotor consisting of two or more blades mechanically coupled to an electrical generator. The turbine is mounted on a tall tower to enhance the energy capture.

The hybrid power means something which is made by the combination of solar & wind power storage element. In energy system the electricity can be generated by two sources at a time like Wind & solar. Here we are developing a module to generate hybrid energy like wind-solar hybrid. Among the above hybrid energy generation module the wind-solar hybrid module are more important because it is abundant in nature and it is very much environment friendly. Hybrid energy generation is more important because the wind does not flow continuously and sun radiation is only present approx. 8 to 10 hours in a day. So for continuous power it is important to hybridize the solar and wind power with the storage batteries. The hybridization in India has large prospect because over 75 % of Indian households face the problem like power cut specially in summer.

In the proposed model, a charge controller is used to regulate the power generated by both solar panels and the wind turbine. It also simultaneously charges battery and gives power to the load. The controller has over-charge protection and short-circuits protection. A specifically chosen battery is used to store the generated power. A Charge controller, considered as a heart of solar generation system, is used to regulate the voltages and current coming from the solar panels and wind generator. It regulates the charge to the batteries preventing any overcharging.

3 ADVANTAGES

The advantages covered by the proposed system are listed as,

- 1) Overcoming disadvantages of standalone renewable electrical energy generation system.
- 2) Producing much more efficiency as two or more renewable energy generation systems working together in the terms of electrical energy generation.
- 3) Since, the system doesn't complexity of system testing and understanding became easy in terms of difficulties.
- 4) System maintenance is remarkably reduced and becomes easy.
- 5) Renewable energy sources like, sun, wind, etc. are utilized so, no waste production.
- 6) Producing clean, friendly to environment, renewable energy.
- 7) Once the system is designed and developed or manufactured, the installation of system is easy.
- 8) Within certain time period the installation cost gets covered.

If the system gets damaged in case, no need of changing entire system or subsystem. Just, changing a damaged component will work out.

3.1 Applications

Some of the applications for the proposed system are listed as follows,

- 1) The system is used for domestic purpose.
- 2) Street lighting, Traffic signals.
- 3) Various monitoring systems.
- 4) Powering up for communication system.
- 5) Pump irrigation systems.
- 6) Small boats like yachts.
- 7) As per requirement of electrical energy the system can be either designed or updated for higher energy requirement.

- 8) When AC mains supply is not available, the proposed system can be used as emergency system with only few changes.
- 9) So, it can be used for almost every electronic, mechanic, viz. system needing/ require electric energy to work on.

4. CONCLUSIONS

While concluding this report, we feel quite fulfilled in having completed the project assignment well on time, we had enormous practical experience on fulfillment of the manufacturing schedules of the working project model. We are therefore, happy to state that the in calculation of mechanical aptitude proved to be a very useful purpose. Although the design criterions imposed challenging problems which, however were overcome by us due to availability of good reference books. The selection of choice raw materials helped us in machining of the various components to very close tolerance and thereby minimizing the level of balancing problem. Needless to emphasize here that we had lift no stone unturned in our potential efforts during machining, fabrication and assembly work of the project model to our entire satisfaction. The model developed by us fulfill the required objectives & hence we are satisfied with our project work.

5. ACKNOWLEDGEMENT

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BIOGRAPHIES (Not Essential)

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