

Wind and Solar Power Generation

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ABSTRACT

Now a day's electricity is most needed facility for the human being. All the conventional energy resources are depleting day by day. So we have to shift from conventional to non-conventional energy resources. In this the combination of two energy resources is takes place i.e. wind and solar energy. This process reviles the sustainable energy 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 are used for converting solar energy and wind turbines are used for converting wind energy into electricity. This electrical power can utilize for various purpose. Generation of electricity will be takes place at affordable cost. This paper deals with the generation of electricity by using two sources combine which leads to generate electricity with affordable cost without damaging the nature balance. Index Terms- electricity, hybrid, solar, power, wind.

1. Introduction

Electricity is most needed for our day to day life. There are two ways of electricity generation either by conventional energy resources or by non-conventional energy resources. Electrical energy demand increases in word so to fulfill demand we have to generate electrical energy. Now a day's electrical energy is generated by the conventional energy resources like coal, diesel, and nuclear etc. The main drawback of these sources is that it produces waste like ash in coal power plant, nuclear waste in nuclear power plant and taking care of this wastage is very costly. And it also damages he nature. The nuclear waste is very harmful to human being also. The conventional energy resources are depleting day by day. Soon it will be completely vanishes from the earth so we have to find another way to generate electricity. The new source should be reliable, pollution free and economical. The non-conventional energy resources should be good alternative energy resources for the conventional energy resources. There are many non-conventional energy resources like geothermal, tidal, wind, solar etc. the tidal energy has drawbacks like it can only implemented on sea shores. While geothermal energy needs very lager step to extract heat from earth. Solar and wind are easily available in all condition. The non-conventional energy resources like solar, wind can be good alternative source. Solar energy has drawback that it could not produce electrical energy in rainy and cloudy season so we need to overcome this drawback we can use two energy resources so that any one of source fails other source will keep generating the electricity. And in good weather condition we can use both sources combine.

2. Hybrid Energy System

Hybrid energy system is the combination of two energy sources for giving power to the load. In other word it can defined as "Energy system which is fabricated or designed to extract power by using two energy sources is called as the hybrid energy system." Hybrid energy system has good reliability, efficiency, less emission, and lower cost. In this proposed system solar and wind power is used for generating power. Solar and wind has good advantages than other than any other non-conventional energy sources. Both the energy sources have greater availability in all areas. It needs lower cost. There is no need to find special location to install this system.

A. Solar Energy

Solar energy is that energy which is gets by the radiation of the sun. Solar energy is present on the earth continuously and in abundant manner. Solar energy is freely available. It doesn't produce any gases that mean it is pollution free. It is affordable in cost. It has low maintenance cost. Only problem with solar system it cannot produce energy in bad weather condition. But it has greater efficiency than other energy sources. It only need initial investment. It has long life span and has lower emission.

B. Wind Energy

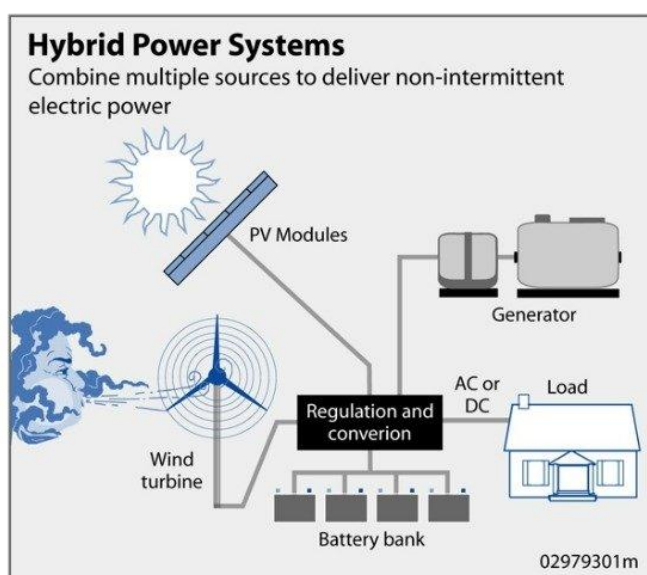
Wind energy is the energy which is extracted from wind. For extraction we use wind mill. It is renewable energy sources. The wind energy needs less cost for generation of electricity. Maintenance cost is also less for wind energy system. Wind energy is present almost 24 hours of the day. It has less emission. Initial cost is also less of the system. Generation of electricity from wind is depend upon the speed of wind flowing. The major disadvantages of using independent renewable energy resources are that unavailability of power for

all time. For overcoming this we use solar and wind energy together. So that any one source of power fails other will take care of the generation. In this proposed system we can use both sources combine. Another way is that we can use any one source and keep another source as a stand by unit. This will lead to continuity of generation. This will make system reliable.

According to many renewable energy experts, a small "hybrid" electric system that combines home wind electric and home solar electric (photovoltaic or PV) technologies offers several advantages over either single system. In much of the United States, wind speeds are low in the summer when the sun shines brightest and longest. The wind is strong in the winter when less sunlight is available. Because the peak operating times for wind and solar systems occur at different times of the day and year, hybrid systems are more likely to produce power when you need it.

Many hybrid systems are stand-alone systems, which operate "off-grid" -- not connected to an electricity distribution system. For the times when neither the wind nor the solar system are producing, most hybrid systems provide power through batteries and/or an engine generator powered by conventional fuels, such as diesel. If the batteries run low, the engine generator can provide power and recharge the batteries. Adding an engine generator makes the system more complex, but modern electronic controllers can operate these systems automatically. An engine generator can also reduce the size of the other components needed for the system. Keep in mind that the storage capacity must be large enough to supply electrical needs during non-charging periods. Battery banks are typically sized to supply the electric load for one to three days.

3. Generation of Hybrid Power



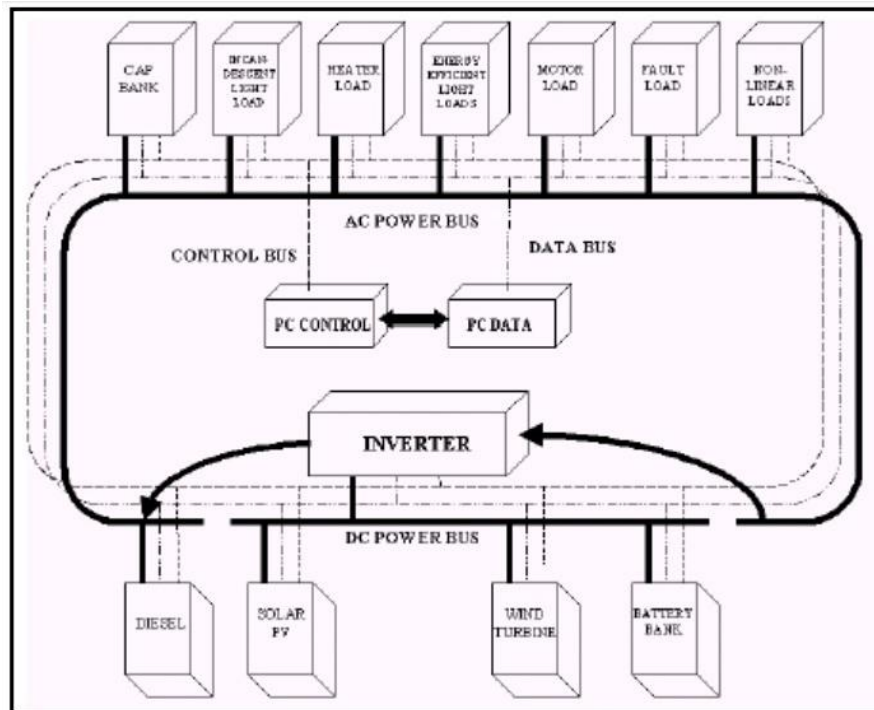
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Adding an engine generator makes the system more complex, but modern electronic controllers can operate these systems automatically. An engine generator can also reduce the size of the other components needed for the system. Keep in mind that the storage capacity must be large enough to supply electrical needs during non-charging periods. Battery banks are typically sized to supply the electric load for one to three days.

Photovoltaic (PV) cells are electronic devices that are based on semiconductor technology and can produce an electric current directly from sunlight. The best silicon PV modules now available commercially have an efficiency of over 18%, and it is expected that in about 10 years' time module efficiencies may rise over 25%. Wind power is electricity produced by a generator, which is driven by a turbine according to aerodynamics in flowing air. Wind power is one of the fastest growing renewable energy technologies around the world. PV modules and wind turbines are now widely used in developed countries to produce electrical power in locations where it might be inconvenient or expensive to use conventional grid supplies, while other homeowners who choose the renewable energy sources prefer to connect their energy system to the grid as a huge 'battery' for some convenient grid-tied situation. In contrast, in many developing countries, especially in rural areas electricity grids are often non-existent or rudimentary, and all forms of energy are usually very expensive. Here the PV modules and wind turbine can be highly competitive with other forms of energy supply. However, the fact that natural energy resources are intermittent and storage batteries are expensive, has led to the utilization of so-called hybrid renewable energy systems. Any power system that incorporates two or more of the following is referred to as a hybrid power system: PV panels, wind turbines, or diesel, propane, gasoline generators. For small loads, the most common combinations (4) are PV-wind hybrid system. PV and wind is a good match, because inland wind speeds tend to be lower in summer, when solar energy can compensate, and higher in winter, when sunshine falls to very low levels. In this paper, a PV-wind hybrid system is presented that can supply electricity to a private house, farm house or a small company or an apartment house with electrical power depending on the need at the site where used. The aim of this study is to introduce the

local PV-wind hybrid system's working principle by reviewing one case where the system is connected to the grid.



Block Diagram of Scope for Future Research.

4. Future Study

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 voltages like lightning. These improvements will also allow the same benefits to instruction realized in electricity and electronics Fig. 3. The DC voltage measured across each PV unit (12 V DC) Fig. 4. Block Diagram of Scope for Future Research. Volume 53, Number 1, 2012 15 classes to be extended to control and instrumentation classes.

5. Conclusion

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 electrical Technology as these are power sources of technological, political, and economic importance in a country. 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 also be considered depending on local interests and resources. The key elements of this test bed concept presented in this paper are two or more renewable power sources can be connected to a power grid with complex electrical interactions.

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