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Review on Streetlight System Using Solar and Wind Turbine

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ABSTRACT: All the conventional energy resources are exhausting. So it is necessary to shift from conventional to non-conventional energy resources. In review work the various combination of energy resources is considered like 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. So various article are studied regarding the nonconventional energy sources and conclusion is drawn.

I. INTRODUCTION

Electricity is very much needed in our day to day life. There are two ways of electricity generation either by conventional (old) energy resources or by renewable energy resources. Electricity demand is increasing day by day with developments and new technologies. Majorly, electricity is generated by the conventional energy resources like coal, water, diesel, natural gases, nuclear energy etc. The main disadvantages of these sources is that they produce waste like ash in coal power plant, nuclear waste in nuclear power plant and taking care of this wastage is very costly and also it damages the nature. On the other side, the nuclear energy waste is very destructive to human being. The non-renewable energy resources are exhausting day by day. Soon it will be completely vanished from earth. We will have to find alternative ways to produce electricity. The new energy source should be dependable, pollution free, and cost-effective. The renewable energy resources should be good substitute for the conventional energy resources. There are many energy resources like geothermal, tidal, wind, solar etc. the tidal energy resource has its drawbacks like it can only be executed on sea shores. While geothermal energy needs very lager manpower to extract heat from earth. Solar and wind are readily available in all circumstances. The non-conventional energy resources like solar, wind can be good alternative source. Solar energy has one disadvantage 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.

II. HYBRID ENERGY SYSTEM

Hybrid energy system is the grouping of two energy sources for giving power to the load. It can also be defined as "Energy system which is designed to extract power by using no. of energy sources is called as the hybrid energy system." Hybrid energy system has good dependability, productivity, less emission, and is cost-effective.
In this proposed system solar and wind power is used for generating power. Solar and wind has good advantages than other than any other 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 works on the radiation of the sun. Solar energy is present on the earth continuously and in ample manner. Solar energy is easily available. It is pollution free and also reasonable in cost. It also has low running cost. Only difficult part with solar system is it cannot harvest energy in bad weather condition. But it has

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greater productivity in all other energy sources with high initial investment. It has extensive life span and has zero emission.

B. Wind Energy

Wind energy is the energy which is extracted from wind. We have to design wind mill. It is renewable energy sources. The wind energy requires less cost for generation of electricity. It also has less maintenance cost and is present almost 24 hours of the day. Wind energy is less polluting with less initial of the system. Generation of power from wind is determined upon the speed of flowing wind.

The major drawbacks of using independent non-conventional energy resources are that unavailability of power for all time. For overcoming this we are designing solar and wind energy based streetlight 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.This will leads to continuity of generation. This will make system dependable. The main shortcomings of this system are that it needs high initial cost. Except that it is reliable, it has less emission. Maintance cost is less. Life span of this system is more. Efficiency is more.

III. LITERATURE REVIEW

The different researches were done to see the review of how solar and wind power generation is effective in different utility scale. The literature survey has been carried as follows:

V. K. Gajbhiye provided the basic information about how energy is essential for the economic evolution and social growth of any country. The world facing the problem of power generation. The fossil energy sources are limited and needed to use properly. This power generated increases the greenhouse effect. The used of the combined solar and wind power system can be more benefits in order to make useful throughout year.

Renato Ricci, Daniele Vitali and Sergio Montelpare described the concept of renewable hybrid microgeneration unit. It has been designed to be entirely fixed into a dedicated LED street lighting system. The key feature of this new idea is the arrangement of a several Savonius vertical axis wind turbine into the structure itself. A photovoltaic panel is integrated to contribute to power generation. The energy is collected by a power conversion apparatus along with a storage device which ensures the illumination also during windless nights. The main application of this project is the individual street lighting, but also a grid associated option is feasible, making the system attuned with microgrid concepts. Different Savonius rotors have been designed and characterized by wind tunnel tests. The adopted cylindrical geometry has shown a maximum power factor of 0.21. A dedicated safety equipment has been designed to stop turbine over-speed by automatic stop in extreme wind condition. A full-scale prototype of the generator/lighting system has been installed. The trial data acquisition is currently in progress to analyze on site presentation and to allow energy simulation.

Chandragupta Mauryan.K.S depicts the role of power system around the world It is a demanding task to integrate the renewable energy resources into the power grid .The combination of the renewable resources use the communication systems as the key technology, which play exceedingly important role in monitoring, operating, and protecting both renewable energy generators and power systems.

N.Sivaramakrishna concluded that all natural surplus energies can be used forproduction of Electricity. Thus, Electricity can be made with a minimum cost and pollution free to anywhere in the world. His paper reveals a novelstep in generation of energy with availability of occurring resources without disturbing the ecological balance. He described a novel and developing Electrical Power Generationdevice by mixing photovoltaic Solar Energy, solarEnergy with Nano-antenna, Wind Energy and non-conventional energy sources. This will give an uninterrupted power supply irrespective of the weather condition without any sort ofenvironmental contamination. The equipment consists of grouping of PVsolar-cell array & Nano-antenna array, a pole mounted windgenerator, storage devices-lead acid , an inverter used tochange DC power to AC power, electrical lighting loads andelectrical heating loads, several fuse and

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junction boxes andassociated wiring, and test instruments for measuringvoltages,power factors,currents and harmonic contaminationdata throughout the system. This hybrid solar-wind powergenerating system is suitable for Industries and also domesticareas.

S. Selvam, Prabhu .K proposed a system where the worldwide issues about power management for renewable resource, Wind / Photovoltaic (PV) hybrid power system in order to improve energy productivity with LED's as the light source and placing the wind turbine in addition to solar. The LED's are energy saving, high glowing efficiency and high useful life to the proposed system. In the same way the position of the turbine plays a major role, we had overcome the design for effective power production. By placing the short armed two turbine in the parallel path due to the to and fro motion of the vehicles air pressure is established on the blades of the turbine. The pressure is developed from both the directions keeps the turbine in continuous motion of all the vehicles such as Trucks, Lorries and Buses, etc., Due to this, an uninterrupted power generation by solar at day time and whenever the vehicles crosses the path both at day and night the turbine rotates and energy is generated. This would put down the electricity bill and reduce the pollution rate to a certain period.

Ashish S. Ingole suggested that people have to shift from conventional to renewable energy resources. In this the combination of two energy resources is takes place i.e. wind and solar energy. This process is for the sustainable energy resources without damaging the nature. We can give uninterrupted energy 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 changing solar energy and wind turbines are used for changing wind energy into electricity. This electrical power can be useful for various purpose. Generation of electricity will be takes place at reasonable cost.
Puneet Kumar Saini concluded that hybrid models have been an effectivemeans of generating electricity throughout the world. Lots ofresearch work has been done and unending to accommodatenew advances in this system. His paper focuses on a hybridsystem comprising of wind mill, solar photovoltaic (PV)modules, electrolyzers and fuel cell for satisfying small electricalloads in milliwatts .Dynamic study of individual components,combination of different components is performed undervarious load conditions. Characteristic curves of each systemare recorded and analysed using clean energy trainer apparatusand software. Comparison is made between solar-wind andsolar-wind-fuel cell systems for a given load profile in milliwattscale. This hybrid system can be used in remote sensing,medical application, electronic gadgets, that consumesmilliwatts of energy.

Wen-jei Yang described how wind-solar hybrid streetlight has three main advantages:
1) Social benefit: Wind-Solar hybrid streetlight is a high-tech environmentally friendly product. Installing the wind-solar hybrid streetlight is done, it gives conformity with the government's environmental protection idea.
2) Economic benefit: It uses and produces power by itself. After the construction of aone-time investment, we can get a long-lasting benefit. Changing the traditionalstreetlight system laid on the underground cable power supply way saves a lot of manpower and monetary investments.
3) Environmental benefit: Each traditional streetlight spends 1825 kWh power in 10 years. According to the standard thermal coal consumption (400g / kWh) to calculating,the standard coal consumption will be 7.3 tons. So a city center will consume876,000 tons of standard coal just in 10 years, It will let out 3 million tons of carbondioxide, 17,500 tons of sulfur dioxide, 13,000 tons of nitrogen dioxide, and so much 10powder and impurity. But when using the wind-solar hybrid streetlights, the pollution will be avoided.

IV. CONCLUSION

Energy is the important material base for the national economic development and people's life. In the past 200 years, the fossil fuels (such as coal, oil, natural gas) energy systems have greatly promoted the development of human society. But the human using fossil fuel has brought the serious environmental pollution and ecological damage at the same time. In recent years, the countries all over the world come to realize the importance of energy to the human, and are more aware of the environmental and ecological damage caused by the use of conventional energy. Countries that are based on national conditions, began to governance and alleviate deterioration of the environment, and put the development and utilization of renewable, pollution- free new energy as an important content of sustainable development. The wind-solarhybrid system is a complementary by using wind and solar energy resources. It is a new

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kind of energy power generation system with high ratio of performance to price. It has a very good application prospect. It is well known that traditional nonrenewable energy sources (such as coal and oil) will run out in the end. Electric energy is mainly relying on hydroelectric and thermal power. While the new energy sources such as wind and solar energy has not been popularized, urban road lighting and landscape lighting electricity consumption is very large. So urgently it is needed to design of wind-solar hybrid streetlights.

The combination of solar and wind hybrid system is also presented in the paper. Overall the aim of the research study to utilised the presented literature for developing the proposed research work.

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