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Solar and Wind Hybrid Energy Generation System

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***Abstract*: As the drive for global industrialization began in the late 18th century, expanding technology made humans dependent on energy, and as the energy crisis unfolded, electricity became a most fundamental necessity of human beings, from home to industrial activity. As a result, the project's goal is to create power without relying on nonrenewable resources or causing pollution. Because renewable solo energy generating methods have drawbacks that hybrid systems must overcome. Because of their abundance, simplicity of availability, and convertibility to electric energy, wind and solar energy have become popular. This project entails the development of a hybrid energy system for a variety of applications that operates under a planned circuitry that utilizes solar and wind power.**

***Keywords*: Hybrid energy, solar system, wind energy, renewable energy, clean energy, electrical energy generation.**

1. Introduction

Advancements in renewable energy technology and concurrent rises in petroleum product costs, hybrid renewable energy systems (HRES) are becoming popular as stand-alone power systems for delivering electricity in distant places. A hybrid energy system, also known as hybrid power, is made up of two or more renewable energy sources that are combined to improve system efficiency and supply balance. Most of us are familiar with how a solar/wind power generating system works; however, all of these generating systems have some or all of the following disadvantages (when considered as a standalone system): Solar panels are too expensive, and the cost of producing power using them is generally higher than the conventional process; it is not available at night or on cloudy days. Wind turbines, likewise, cannot work under high or low wind speeds. Solar hybrid power systems combine solar energy from a photovoltaic system with another energy source to generate electricity.

2. Objectives and Scope

- In this research, we examine various statistics regarding wind and solar for generating hybrids at a small scale, which will aid decision makers in analyzing the many elements in constructing a hybrid generation plant.
- Varied minimal costs with the maximum generating capacity.
- The results reveal that the hybrid system can estimate energy generation based on experimental and theoretical data. Different time periods have been used to calculate the power and efficiency in the future.
- This strategy encourages engineers to build a small-scale solar-wind hybrid system in the Jodhpur area.
- India's government makes a crucial decision about hybrid energy sources.
- The Jawaharlal Nehru Solar Mission (JNNSM) aims to create 20 gigawatts of solar energy by 2022 and be 100% renewable by 2050.

3. Methodology

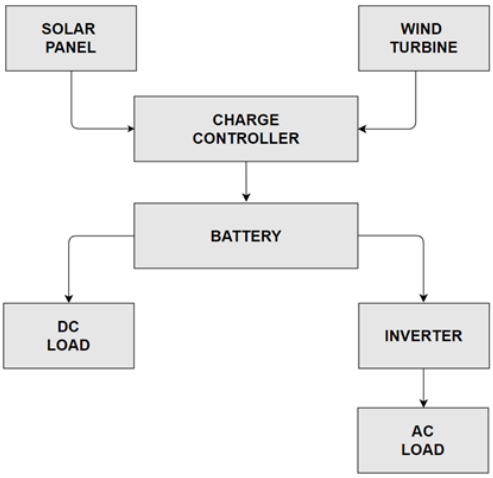

Fig. 1. Block diagram of proposed system

The suggested system is a hybrid/combination of two separate systems, such as solar and wind. Roof wind ventilators are a reliable and cost-effective ventilation technology. The ventilator's operation is based mostly on the ventilator pressure and temperature, which aids natural convection. The roof tops have wind ventilators installed on them (attic space). The rotating components' impellers are extended to the outside environment.

Ventilators rotate based on the speed of the wind and do not require any electrical power.

The main goal of a roof wind ventilator is to reduce the temperature within a building/industry by removing exhaust hot air and replacing it with fresh air generated inside the industry/workshop, etc. It is very light in weight and has a lower density. As a result, they tend to move upward to the roof

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ventilator's natural convection.

The roof ventilator rotates, sucking up the hot gases and expelling them into the atmosphere. This is due to a low pressure in the vicinity of the ventilator. Fresh cold air is formed and a greater density flow inside the industry is created as a result of the pressure drop caused by the roof ventilator. This cycle maintains a constant supply of hot and cold fresh air while also assisting the ventilator's rotation. As a result, the roof ventilator runs continuously 24 hours a day, 7 days a week, reducing the indoor temperature by 3-4 degrees Celsius with no power use. Ventilator, solar panel, DC Generator, battery, load, and other items are included in this project. Electric DC Generators are supplied in this project, which transform mechanical energy into electrical energy. Faraday's law is the foundation of generator operation.

The torque produced by a roof wind ventilator is minimal. A solar panel is included. Solar panels are solar panels that capture the sun's rays and convert them to power or heat.

4. Advantages

The advantages covered by the propose system are listed as,

- Overcoming disadvantages of standalone renewable electrical energy generation system.
- Producing much more efficiency as two or more renewable energy generation system working together in the terms of electrical energy generation.
- Since, the system doesn’t have microcontroller or microprocessor the complexity of system testing and understanding became easy in terms of difficulties.
- System maintains is remarkably reduced and becomes easy.
- Renewable energy sources like, sun, wind, are utilized so, no waste production.
- Producing clean, friendly to environment, renewable energy.

5. Disadvantages

- The first-time installation cost is huge in terms of finance.
- The circuit designing complexity is more as there in no micro-computer for controlling action.

6. Conclusion

The most cost-effective way to reduce electricity bills is to use a solar-wind hybrid energy system. It also avoids the high expenses of connecting grid power lines to rural places and provides a clean, renewable, non-polluting source of energy. Summary of the conclusion. Even while wind energy offers numerous benefits, it also has significant drawbacks. Nonetheless, the criteria for long-term viability have been assessed. Because of the higher wind speeds, deep sea farms are more efficient and generate more electricity, but they are also more costly and offer obvious obstacles. Last but not least, solar panels may generate more electricity than wind turbines.

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