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A Research Paper on Hybrid Photovoltaic, Savonius Type Power Generation System

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Abstract: *The project is about the manufacturing and optimization of Wind energy is the environmental pollution free, hazardless and one of the best renewable energy for generation of electric power. The main aim of the paper is "to produce current using Vertical Axis Wind Turbine (VAWT) with wind deflectors ". This paper proposes VAWT by designing guide vanes and fabricating with a low cost and getmore shaft torque and rpm. And also, it is supposed to be a portable wind turbine. Energy is a hot topic in the news today: increased consumption, increased cost, depleted natural resources, our dependence on foreign sources, and the impact on the environment and the danger of global warming. Alternative energy sources, also called renewable resources, deliver power with minimal impact on the environment. These sources are typically more green/clean than traditional methods such as oil or coal. In addition , alternative resources are inexhaustible. The output current is stored in series of battery to appliances throughconverter and step up transformer. The Construction, working, parts of windmill, materials are discussed detailed in this paper.*

Keywords:- VAWT, Windmill, Wind turbine etc

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I. INTRODUCTION

Wind power or wind energy is mostly the use of wind turbines to generate electricity. Historically, wind power has been used in sails, windmills and wind pumps. Wind power is a popular, sustainable, renewable energy source that has a much smaller impact on the environment than burning fossil fuels.

1.2 Principle of Photovoltaic Conversion

The photovoltaic conversion is based on the photovoltaic effect, that is, on the conversion of the light energy coming from the sun into electrical energy. To carry out this conversion, devices called solar cells are used, constituted by semiconductor materials

1.3. Principle of Wind Energy Conversion

The Nature of Wind ,the circulation of air in the atmosphere is caused by the non-uniform heating of the earth's surface by the sun.The air immediately above a warm area expands, it is forced upward by cool, denser air which flows in from surrounding areas causing wind.

1.4 Block Daigram Of Hybrid Photovoltaic and Wind Power Generation.

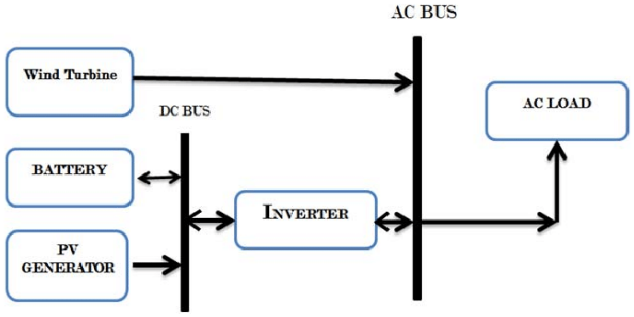

Figure 1: Hybrid Photovoltaic and Wind Power Generation.

II. CLASSIFICATION OF WIND MILLS

Wind energy is conversion systems are called by various names as wind mills, wind generator, wind turbines, wind turbine generators etc.

Based on orientation of the axis of rotor:-

- Horizontal Axis
- Vertical axis

Based on type of rotors :-

- Propeller type (Horizontal axis)
- Multiple blade type (Horizontal Axis)
- Savonius type (Vertical axis)
- Darrieus type (vertical axis)

2.1 Vertical-Axis Wind Turbine (VAWT)

The Vertical-Axis Wind Turbine (VAWT) is a wind turbine that has its main rotational axis oriented in the vertical direction.

The two types of vertical-axis wind turbines are the Darrieus wind turbine, which turns a shaft using lift forces, and the Savonius wind turbine, whose cups are pushed by direct wind forces.

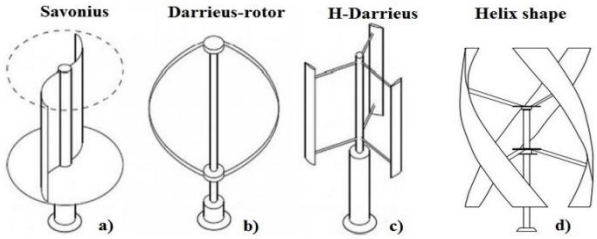

Figure 2: Types of Vertical-Axis Wind Turbine (VAWT)

III. WORKING

Hybrid system consisting of PV and Wind are the main energy sources. The output of PV is dc but output of wind is ac, this ac is converted to dc by the help of inverter. The dc to dc converters are also connected in this system.

3.1 The Wind Energy Conversion System

The wind energy conversion system (WECS) includes wind turbines, generators, control system, interconnection apparatus. Wind Turbines are mainly classified into horizontal axis wind turbines (HAWT) and vertical axis wind turbines (VAWT). Early wind machines ranged in their rated powers from 50 to 100 kW, with rotor diameters from 15 to 20 meters. Commercial wind turbines now have ratings over 1 MW and machines for the land based and offshore applications have rated poweroutputs reaching 5 and even 7-10 MW of rated power for off-shore wind applications.

3.2 Basic Components of Wind Energy Conversion System

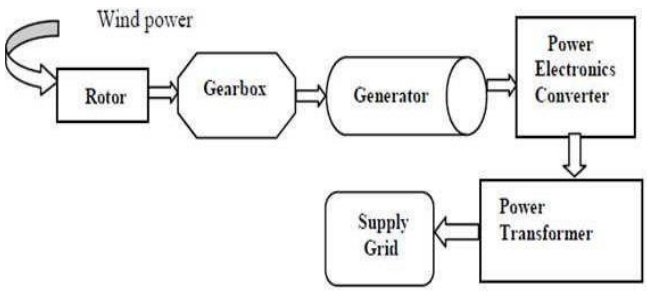

Figure 3: Block diagram of Components of Wind Energy Conversion

3.3 Major Components of a Commercialwind Turbine are

1. Tower
2. Rotor
3. High speed and low speed shafts
4. Gear box
5. Generator
6. Sensors and yaw drive
7. Power regulation and controlling units
8. Safety systems

IV. PROBLEM STATEMENTS

4.1 Site Selection

Four types of sites are considered suitable

- 1. Plane land sites
- 2. Hill top sites
- 3. Sea-shore sites
- 4. Off-shore shallow water sites

4.2 Why Solar and Wind Energy ?

- No waste
- Reliable
- Improved corporate image
- Available worldwide
- Low operating cost
- Increased over long-term electricity rates

4.3 Why Future Trees?

- Due to less land requirement
- Efficient energy generation
- It can collect energy from wind and sun
- New design

V. METHODOLOGY

The wind energy resource survey is an essential element in a programme involving the extensive use of wind energy. Previous survey programmes serve as a guide for the procedure, starting with a review of the available information, survey methods and existing wind data. An observational programme is usually necessary if the resource becomes a serious option for development. A regional survey to obtain data from likely sites can be followed by detailed studies at the most promising locations. Initially the survey can be used to choose the best sites for supplying the cheapest energy. A carefully set-out system might also provide capacity substitution, which is an important factor in the economics.

Improving Health & Safety and reducing the cost of ownership.

- Literature survey
- Feasibility study
- Documentation
- Mechanism synthesis
- Designing
- Final assembly
- Product testing & Installation and monitoring

VI. OBJECTIVE

- Determine the efficiencies of varying wind turbines.
- Determine the cost of different types of wind turbines.
- Conduct a cost benefit analysis for the researched windmills.
- Determine if it is worthwhile to install a small scale wind turbine on a home.

VII. DESIGN

7.1 Design of the Wind Turbine

In this project, the Wind Turbine are very important for achieving the goals of our project as well as for increasing the performance of the Min Wind Mill.

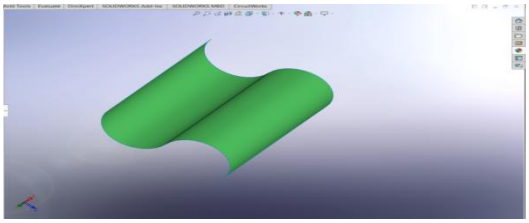

Figure 4 : Design of the Wind Turbine

7.2 Design of the Wind Deflectors

Wind deflectors play major role of this system. Because of that Vertical Axis Wind Turbine has low efficiency than Horizontal Axis Wind Turbine. So, our task is to be improving the performance of the VAWT.

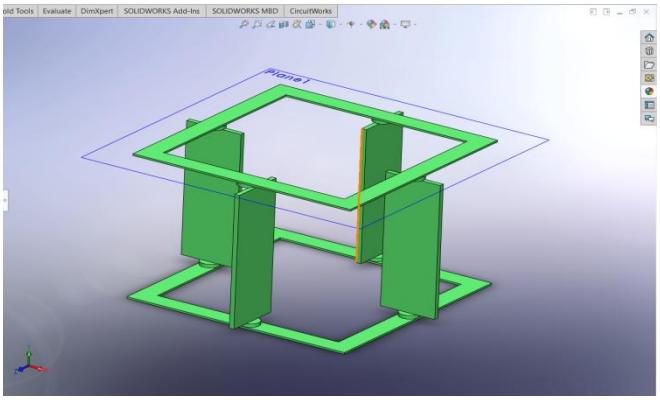

Figure 5 : Design of the Wind Deflector

VIII. PROJECT COMPONENTS

a. BLADE
b. GENERATOR
c. SOLAR PANEL
d. DEFLECTOR
e. TRIPOD
f. I BASE
g. LED LIGHT
h. PELTIER
i. SUM. CENTRIFUGAL PUMP
j. PIPES
k. BATTERY

IX. EXPECTED OUTCOMES

Street light

(we are using LED) 12 volt 0.5 amp

Irrigation spray

(for the farming purpose) Using pump which work between 6 v to 12 v. Pump we are using summarisable centrifugal.

Gas generation :

Cathod and Anode are attached at the base Its generally aelectrolysis process.

Charging unit:

we have attached one charging unit as a outlet

Exhaust fan

at an outlet

Hot water and cold water generation

We are using peltier for generation of hot water and cold water Peltier effect is atemperature difference created

by applying a voltage between two electrodes

X. ADVANTAGES AND DISADVANTAGES

11.1 ADVANTAGES

- It is renewable source of energy.
- Non- polluting, so it has no adverse influence on the environment.
- Wind energy systems avoid fuel provision and transport.
- On a small scale upto a few kW systems is less costly.

11.2 DISADVANTAGES

- Noisy in operation.
- It needs storage capacity because of its irregularity.
- Wind Energy available in dilute and fluctuating in nature.
- Relatively high overall weight

XI. TEST RESULTS

S Blade

Wind Speed 6 m/s ,Voltage 28 Milli Volt, 0.08 Current Ampere

Solar Panel

18x0.5=9V

Battery

Maximum Dicharge Current 108A in 5 sec

Irrgiation spray

180ml within 1 min discharge

Electrolysis Process.

water is decomposed into oxygen and hydrogen gas, when electric current is passed through it. Water molecule is decomposed in to H+ and OH- ions

XII. CONCLUSIONS

In this paper review of the power quality improvementof hybrid power system is discussed. By using Vertical Axis Wind Turbine (VAWT) with wind deflectors. Thus We Conclude that Renewable Energy can be utilized at its low running Cost &Maintenance. Eco Friendly & Easier To Install & Maintained. Main Moto Is To Provide This Protable Machine to Destered Management Team & NGO.

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