

# International Journal of Innovative Research in Science, Engineering and Technology

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## Hybrid Power Generation Using Solar and Vertical Axis Wind Mill

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**ABSTRACT:** In this project we have fabricated the cylindrical wind turbine with solar panel. Our main aim of this concept is to generate the electricity power by using non conventional methods. So we have fabricated the new cylindrical turbine for the Power generation process. Here we are following the same concept of wind mill process. Cylindrical wind turbine is a simplest turbine. Cylindrical wind turbine is called savonius wind turbine.

### I. INTRODUCTION

Energy has been playing an important role in human and economic development and world peace. Since the world economic resuscitation and boom. World total energy annual consumption is increased. While fossil fuel (i.e. coal, oil, natural gas) provided three quarters of the total. At current energy consumption rate proven coal reserve should last for about 200 years. Oil for approximately 40 years and natural gas for annual 60 years with the contradiction between rapid development.

The main function of Hybrid solar energy is that it obtain energy from both sources-solar energy with the help of PV panels & wind energy from wind turbines. Solar panel absorbs the sunrays and convert it into DC current. And wind turbine moves due to the force of wind & its rotor connects with a generator also rotates and gives AC current. This AC current converts into DC with the help of AC-DC converter. Now both the current works simultaneously and goes to the circuit board and charge the mobile phones connected with the help of wires.

Renewable energy from wind and solar photovoltaic are the most ecological type of energy to use. They are based on a clean and efficient modern technology, which offers a glimmer of hope for a future based on sustainable and pollution-free technology. The importance of using renewable energy system, including solar photovoltaic (PV) and wind has been attracted much these days, because the electricity demand is growing rapidly all over the world. Therefore, there is an urgent need for renewable energy resources, and formulated as a national strategy for the development of renewable energy applications. For this purpose, uninterrupted efforts to develop systems more attracting with low costs, a high efficiency and multifunction are required. Small-scale stand-alone power generation systems are an important alternative source of electrical energy, finding applications in the places where the conventional production is not practical. Consider, for example, remote villages in developing countries or ranches located far away from main power lines. The certainty of load demands at any time is considerably increased by the hybrid production systems, which use more than one source of energy. It is possible the high outputs production factors combine wind turbines and photovoltaic arrays with storage technology to master the Movements of the production facility. Aneffective energy storages necessary to obtain a constant power the power delivered by wind and solar should be easily converted into energy stored

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## II. LITERATURE REVIEW

**1.TITLE:** Design and Fabrication of a Hybrid Solar & Micro Wind Power Generator

**AUTHOR:** Vishnu Khetan, Hari Kumar Singh, Rohit Kumar

This paper is concerning to designing of the micro hybrid system using solar energy and wind energy simultaneously. Now a day's electricity is most required facility for the human being. All the conventional energy resources are reducing day by day. So we have to move from conventional to non-conventional energy resources. In this research paper the combination of two energy resources such as i.e. solar and wind energy. The paper defines the design and fabrication of the hybrid solar and micro wind turbine. Solar PV cell and micro wind turbine have a great potential. In this research paper hybrid system we have discuss the design and fabrication of such a system. Hybrid system is simplified design, effectual power production as there is no gear box in the turbine, easiness in the installation, and maintenance coat is low. A hybrid system is design for the generation of power up to 40 W. There are 24 horizontal axis wind turbine in vertical plane is fabricated along with the 10 Solar PV cell of 3.2 W (Max Power). Designing parameter is evaluated and discuss in this research. Various parameter are discusses which affect the efficiency of the both solar PV cell and micro wind turbine

**2.TITLE:** Hybrid Power Generation By Solar Tracking And Vertical Axis Wind Turbine (Design And Analysis)

**AUTHOR:** Mr. Mohammed Mustafa , Mr. V. Sunil , Mr. Uday Bhasker

The main objective of this project is "Hybrid Power Generation by Solar Tracking and Vertical Axis Wind Turbine" wherein, design of the components and their analysis has been carried out and, the fabrication of the model has been done as per the calculations that have been obtained from the design and analysis. Electricity has helped in reducing physical efforts to a very large extent, but, the way in which it is produced is quite a matter of concern. Even today, most of the electricity that we use is produced through conventional methods. These conventional methods commonly use fossil fuels to produce electricity. Not only are these methods expensive, but also cause grave damage to the environment. The use of fuels for the generation of electricity results in increased costs and emissions of hazardous pollutants. The only alternative is a new method that is not only cheap and efficient, but also eco-friendly

**3.TITLE:** Hybrid Power Generation by Using Solar and Wind Energy Hybrid Power Generation Applicable To Future Electric Vehicle

**AUTHOR:** Poorani.S , Karpagam, Rajeswari Kalliappan

The objective of this concept is to generate electric power from windmill and solar panel and synchronizing with EB power supply. Nowadays power demand is increased highly so need the alternate power source it is very useful to generate the electrical power from natural resources in order to compensate the electric power demand. The hybrid power generation is a new innovative concept which have designed in this project. It is one of the non conventional energy; here generating the power supply from the natural resources and also during un availability of natural resources the EB power supply is used for the load and excessive generation of solar, wind mill supply is exported to the grid of the EB supply at any voltage level. This project is designed with the following parts are wind mill arrangement, solar panel, dynamo, rectifier, filter and battery and connected to the Electricity Board supply.

**4.TITLE:** Wind-Solar Hybrid Electrical Power Generation in Jordan Ghassan Halasa

**AUTHOR:** Amman, Jordan

The paper presents the electrical power generation using solar- and wind-energy for the country of Jordan. Presently with the oil prices are on the rise, the cost of electrical power production is very high. The opportunity of a large wind and solar hybrid power production is being explored. Sights are chosen to produce electricity using, the wind in the Mountains in Northern Jordan and the sun in the Eastern Desert. It is found that the cost of windmill farm to produce 100-150 MW costs \$290 million, while the solar power station to produce 100MW costs \$560. The electrical power production costs per kWh are 2 cents for the wind and 7.7 cents for the solar. The feasibility for using wind energy is now, solar energy when price of oil reaches \$100 per barrel. The paper also discusses different control methods to link with the national grid.

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### III. OBJECTIVE OF PROPOSED WORK

- The main objective of this idea is to produce of electrical energy in a pollution free manner.
- By incorporating a hybrid power generation which consist of both wind and solar may be productive while comparing to the individuals.

### IV. COMPONENTS

S.no	Components
1	Bearing
2	Shaft
3	Pulley
4	Blades
5	Belt
6	Frame
7	Solar Pannel
8	Solar Charge Convertor
9	Battery
10	Dynamo

### V. CALCULATION

#### Specification

Design Parameter	: Belt
Material of Belt	: Rubber
Type of Belt Used	: V-Belt
Speed of Driving Pulley	: 7200 rpm
Diameter of Driving Pulley	: 20 mm
Diameter of Driven Pulley	: 110 mm
Voltage	: 230 V
Current	: 32 A
Centre Distance	: 193 mm

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## Power Transmitted

$$P = V \cdot I$$

$$= 230 \cdot 32$$

$$P = 7360 \text{ W}$$

$$P = 7.36 \text{ KW}$$

## Arc of Contact

$$\Theta = 180^\circ - ((D-d)/C) \cdot 60^\circ$$

$$\Theta = 180^\circ - ((110-20)/193) \cdot 60^\circ$$

$$\Theta = 152.02^\circ$$

## Length of the Belt

$$L = 2C + \pi/2 (D+d) + (D-d)^2/4C$$

$$L = 2 \cdot 193 + \pi/2 (110+20) + ((110-20)^2)/(4 \cdot 193)$$

$$L = 386 + 204.2 + 10.49$$

$$L = 600 \text{ mm}$$

## Number of Belt

Tension on tight side  $T_1 = 1312.75$

Assume  $\mu = 0.28$

$$\beta = 20^\circ$$

No of belt = Total power/Power transmitted by one belt

$$T_1/T_2 = e^{(\mu\Theta/\sin 2\Theta)}$$

$$1312.75/T_2 = e^{(0.28 \cdot \Theta/\sin 20^\circ)}$$

$$\Theta = (\pi/180) \cdot 152.02$$

$$\Theta = 2.65 \text{ rad}$$

$$1312.75/T_2 = e^{(0.28 \cdot 2.65/\sin 20^\circ)}$$

$$T_2 = 1312.75/8.75$$

$$T_2 = 150 \text{ N}$$

$$V = \pi DN/60$$

$$= (\pi \cdot 20 \cdot 10^{-3}) \cdot 7200/60$$

$$= 7.53 \text{ m/s}$$

$$\text{Power transmitted by one belt} = (T_1 - T_2) \cdot V$$

$$= (1312.75 - 150) \cdot 7.53$$

$$= 8755.5 \text{ w}$$

$$= 8.75 \text{ KW}$$

$$\text{Number of belt , } n = (\text{Total power /power transmitted by one belt})$$

$$= (7.36)/8.75$$

$$= 0.84 \sim 1$$

$$\text{Number of belt , } n = 1$$

## VI. CONCLUSION

Obviously, a complete hybrid power system of this nature may be too expensive & too labour 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 & an inverter, or just a PV panel & a DC motor. The enhancement to instruction, especially in making electrical power management. More physical intuitive & real world are substantial & the costs & labour involved in some adaptation of the ideas in in this paper to a smaller scale setup are reasonable. The use of Solar & Wind hybrid power generation is an especially vivid & relevant choice for students of electrical technology as these are power source of technological, political & economic importance in a country.

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