

MODELING OF GREEN ENERGY SOURCES –A SOLAR AND WIND HYBRID MODEL

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Abstract - In parallel to developing technology, demand for more energy makes us seek new energy sources. The most important application field of this search is renewable energy resources. Wind and solar energy have been popular ones owing to abundant, ease of availability and convertibility to the electric energy. We will focus on Modeling the design and verification process for Renewable and Green Energy sources. Samples like solar, wind and tidal energy are used for making model. The term Green energy can be associated with environment-friendly Generation, transport, storage and control of electrical energy. Solar power, wind power and the natural flow of water are resources that comply with our definition of Green Energy. Since the natural fossil energy resources are limited on this planet, we have to put our focus on green power generation like solar and wind power.

Keywords - component: Green Energy sources, Renewable .

I. INTRODUCTION

The electricity sector in India supplies the world's 6th largest energy consumer. Contribution of various power sources to generation of Electricity is :

Power plant	Electricity Generated
Thermal	67.75%
Hydroelectric	21.73%
Nuclear	2.78%
Renewable Energy sources	10.73%

Solar power

In 2010, India's installed wind generated electric capacity was 13,064 MW. In July 2009, India unveiled a \$ 19 billion plan to produce 20,000 MW of solar power by 2022. With the technological developments, products which run on nonconventional energy sources will be more popular near future with proper design and materialistic advancements. n-type layer exposed to the sunlight. Cells are arranged in a frame to form a module. Modules put together form a panel. Panels form an array. Each PV cell is rated for 0.5- 0.7 v and a current of 30 mA/sq.cm. The equivalent circuit of a photovoltaic cell is shown in fig. 1. It consists of an ideal source producing a current I_{Ph} , proportional to incident light, in parallel with a diode D . Shunt resistance R_p models the effect of leak current but in many cases this can be neglected due to its relative large value.

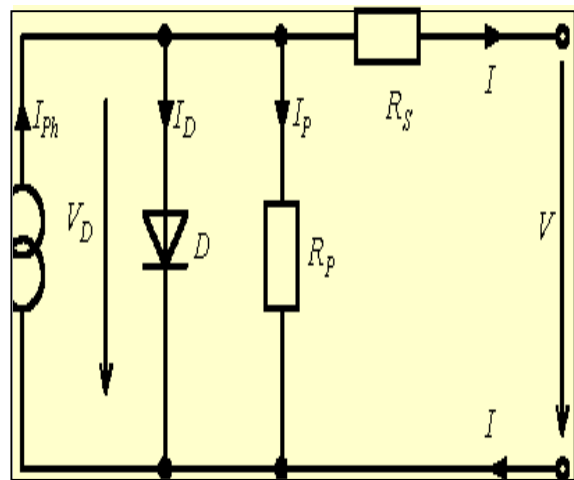
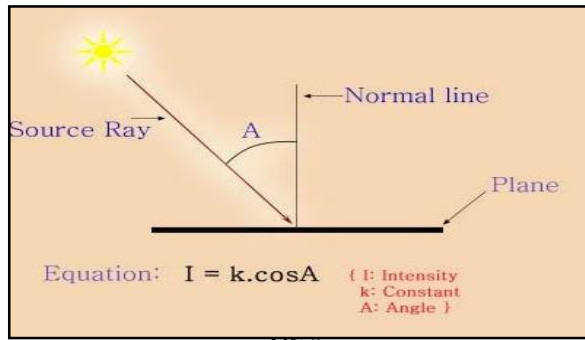


Fig. 1: PV cell model

The traditional solar panel which is fixed on a constant base is shown in fig.





The output of solar cells depends on the intensity of sunlight and the angle of incidence. The angle of incidence is the angle between the normal and an incident (that is, an incoming) light ray shown in fig. above

Wind Power

Wind Power is very popular nowadays, because of the high power that can be achieved in a efficient way. The Wind is identified as a key natural energy resource, which contributes to reducing undesirable emissions due to fossil fuel power plant operation. Worldwide installed wind power capacity has reached 120GW at the end of 2008 with a 36% increase in comparison to the previous year. However, with the increase of wind power penetration, the technical and operational challenges associated with wind energy have also become more apparent. These challenges include, the elimination of power fluctuations, improving power quality, connection of wind farms to weak grids, prediction of wind power and changes in operating strategies of conventional power plants .Irregular variations of the wind power are the root cause of the first challenge, and more or less partial cause of the others.

Wind turbines are used to convert the wind power into electric power. Electric generator inside the turbine converts the mechanical power into the electric power. Wind turbine systems are available ranging from 50w to 2-3 MW.

Mechanical output of turbine of wind generator is dependent on the speed of turbine. For small turbines, wind speed is about 3.5m/s. Large wind power plants require wind speed of 6m/s. but wind speeds higher than this are available in many locations.

Hybrid Electric systems

Hybrid Electric systems combines wind and solar photovoltaic technologies offering several advantages over either single system.

Wind speeds are low in summer when the sun shines the brightest and longest. The wind is strong in winter when less sunlight is available. Because the peak operating times for wind and solar systems

occur at different times a day and year, hybrid systems are likely to produce power when required.

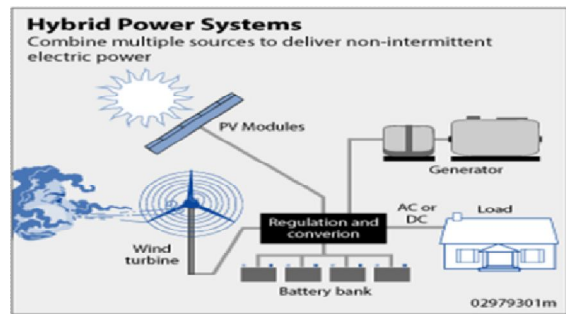


Fig. 3 : Hyrid power system solar and wind.

The hybrid unit contains two complete generating plants, a solar plant and a wind system. The two sources are connected in parallel, the power is connected to a DC to AC inverter and is then supplied from the inverters output to a single phase load.

Simulation model for wind generator

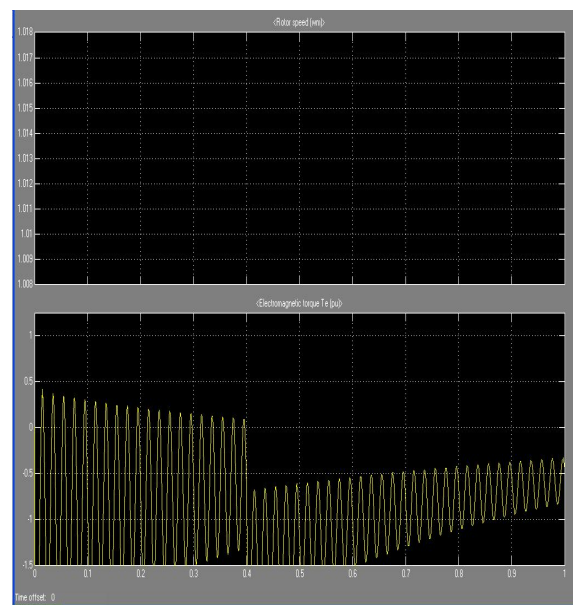
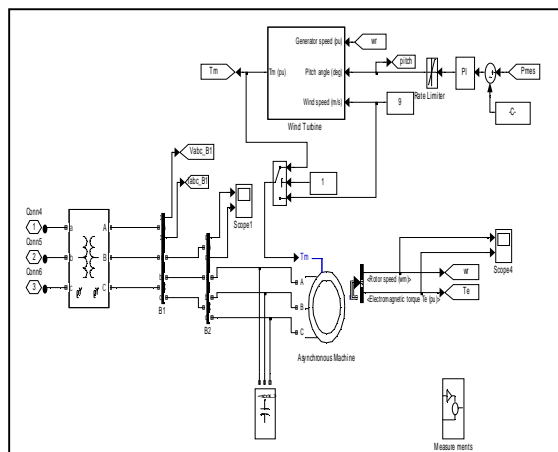


Fig. 4 : Output waveform of wind generator.

II. CONCLUSIONS

Samples like wind, Solar, Hybrid Electrical Vehicles(HEV) and Fuel Cell can be used for making Hybrid model. Hybrid model will utilize both Solar and Wind energy sources. Wind turbine is designed and is placed with solar panel . This hybrid model will utilize both the sources to generate power.

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