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Review On Design And Analysis Of Solar Wind Mill

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Abstract :

Considering the energy security concern for and commitment to a 'Low Carbon Growth Strategy', the 12th Five Year plan of the country included plans to ensure sustainable development of the power sector. Due to the RE impetus an increase in the development of medium to high density wind and solar farms in India is expected. In this scenario it becomes important and necessary to revisit the impacts of RE projects in the neighborhood where these projects are coming up. Thus, this study is commissioned by MNRE to assess the environmental and socio-economic impacts of RE projects in India, particularly from solar PV and on-shore wind farms in hybid mode.Hence to test this we have tried to fabricate a hybrid solar cum wind mill power plant model.

1.Introduction

India's rising economic activities, growing population and improving living standards have led to a steady growth in her appetite for quality and quantity of energy services. India's total population grew by 190 million during 2001-20111. India's economy is also expanding fast (Government of India's 12th Five Year plan for 2013-17 aims at an annual economic growth rate of around 8% (Planning Commission, 2011)) and to sustain this level of growth India needs to quickly add energy generation capacity. Solar and wind power are the best souces of power generation with zero emiision.

1.1 Problem statement:

Only solar power is available during 9 am to 6pm and not 24 hours a day.also its lesser in rainly seasons due to clouds. Wind power is also intermittent and constant 24 hours .so need a solution to get constant power 24 hours.

Renewable Energy (RE) solves the sustainability problem associated with conventional fuels used for power generation as these sources are non-exhaustible and relatively clean. Further, RE is also an economical off-grid

energy solution for remote locations. The 11th Five Year Plan realized the significant role of new and renewable energy to enhance the domestic energy supply options as well as the need to diversify energy sources. The 12th Five Year plan's strategy aims to develop the RE sector through capacity addition in wind power, small hydro power, solar power, and bio-power. Thus the RE space in the country is going to witness a large number of RE projects in coming years.

2.LITERATURE SURVEY

J.Godson et al. (2013). This study describes a Solar-Wind hybrid Power system that generates power using renewable solar and wind energy. The microcontroller is primarily responsible for system control. It ensures the most efficient use of resources and hence increases efficiency when compared to their individual modes of production. It also improves the reliability and lowers reliance on a single source.[1] Ashish S. Ingole et al. (2015). This paper is about the generation of electricity by using two sources combine which leads to generate electricity with affordable cost without damaging the nature balance.[2] **Yashwant Sawle et al. (2016).** The purpose of this study is to present an overview of hybrid system architecture, modelling, renewable energy sources, criteria for hybrid system optimization and control methodologies, as well as software for optimal sizing. A case study of several standalone hybrid combinations for remote area Barwani, India was also examined, and it was discovered that the PV–Wind–Battery–DG hybrid system is the most cost and emission efficient of all the hybrid system combinations.[5] Muhammad Zeeshan **Malik et al.(2020).** The main goal of this study is to generate electrical energy with minimal pollution by using renewable and clean energy. To solve the limitations of renewable free-standing generating, we use a hybrid system. The solar-wind hybrid energy generation system's operational model was successfully tested. It is suggested that all rural community residents employ the solar-wind hybrid system for electricity generation, based on the system's cost and effectiveness.[8]

2.1 Objective :

- To experience the design of solar hybrid wind mill
- To develop the working model of solar wind mill

Solar panel of size 1x1 feet can generate 10 watt energy.accordgnly we can decide the size of panels as per power generation required.

Wind is the motion of air masses produced by the irregular heating of the earth's surface by sun. These differences consequently create forces that push air masses around for balancing the global temperature or, on a much smaller scale, the temperature between land and sea or between mountains.

Wind energy is not a constant source of energy. It varies continuously and gives energy in sudden bursts. About 50% of the entire energy is given out in just 15% of the operating time.

Wind strengths vary and thus cannot guarantee continuous power. It is best used in the context of a system that has significant reserve capacity such as hydro, or reserve load, such as a Desalination plant, to mitigate the economic effects of resource variability.

The power extracted from the wind can be calculated by the given formula:

PW=0.5ρπR3Vw3CP (λ,β)

Pw = extracted power from the wind,

ρ= air density, (approximately 1.2 kg/m3 at 20¤ C at sea level)

R = blade radius (in m), (it varies between 40-60 m)

Vw = wind velocity (m/s) (velocity can be controlled between 3 to 30 m/s)

Cp = the power coefficient which is a function of both tip speed ratio (λ), and blade pitch angle, (β)(deg.)

Power coefficient (Cp) is defined as the ratio of the output power produced to the power available in the wind.

The highest wind speed at which a wind mill stops producing power is called cut-out speed. It is about **30m/s**.

Power Generation in Generator:

R.P.M. of Generator: 60

Voltage of Generator: 240 AC

Current of Generator: 0.1 Ampere

Attribute	Operational Activity resulting in pollution	Associated issues	Significance of impact	Applicable Law
Human Health & Safety	• Wind mill operations • Siting of windmills near utilities and human habitation.	• Noise from movement of fans • Safety concerns due to electricity transmission infrastructure	• Noise pollution from wind mills was minimal as not reported by the local community as a	• Electricity Act 2003, relevant para-electricity Laws, section 67, 68 & 69 • Central Electricity Authority (CEA) -

			problem.	safety requirements for Operations, Construction and maintenance of electric plans and electricity lines; Regulations 2011
Community	• Wind mill siting and operations.	• Increased local employment through job opportunities in services that support power projects • Conflict over resources and use of forest or agricultural land between locals and wind-mill owners may occur.	• Locals had access to project sites for collection of natural (if any)resources • Laws relating to Resettlement and Rehabilitation, locals governments like *Panchayats* exist to safeguard local interests.	• National R&R Policy • *Panchayat* Act • 73rd Constitutional Amendment
Land	• Siting of wind mill requires 2-3 acres of land per MW on an average in agricultural or forest areas.	• Solar farm development changes the land use. • Perceived conflict with local community if common resources are put to commercial use.	• Agricultural land was found to be acquired by paying market rates. • In all cases locals were allowed to use the natural resources falling in the project boundaries (i.e. cattle grazing, fodder collection allowed)	• Land Acquisition Act. • Forest (Conservation) Act, 1980

Fig. 2.1 social impacts charts

2.2 APPLICATIONS OF WIND ENERGY

Wind-turbine generators have been built a wide range of power outputs from kilowatt or so to a few thousand kilowatts, machine of low power can generate sufficient electricity for space heating & cooling & for operating domestic appliances.

Low power WEC generators have been used for many years for the corrosion protection of buried metal pipe lines.

Application of more powerful turbines up to about 50kw, are for operating irrigation pumps, Navigational signal. Aero generators in the intermediate power range, roughly 100 to 25 KW can supply electricity to isolated populations.

Advantages

a) It is a renewable source of energy.

b) non-polluting so it has no adverse influence on the environment.

c) avoid fuel provision and transport.

d) On a small scale up to a few kilowatt system is less costly.

e) On a large scale costs can be competitive conventional electricity and lower costs could be achieved by mass production.

f) They are always facing the wind - no need for steering into the wind.

g) Have greater surface area for energy capture -can be many times greater.

h) Are more efficient in gusty winds – already facing the gust.

i) Can be installed in more locations - on roofs, along highways, in parking lots.

j) Can be scaled more easily - from mill watts to megawatts.

Disadavntages:

a) solar panel cleaning is hectic

b) installtion of wind mill is hectic in case of heavy turbines

Applications

a) malss

b) highway ligts

c) remote area electricity

d) malls,hospitals,schools,

e) apartments ,small houses

FUTURE SCOPE

To utilize the available wind resources and to reduce the usage of non renewable energy resources. Wind energy is by far the fastest-growing renewable energy resource. The wind energy industry so far has been supported by market incentives backed by government policies fostering sustainable energy resources. Large-scale wind facilities approaching the output rating of conventional power plants, control of the power quality is required to reduce the adverse effects on their integration into the network. These wind turbines can be used to provide constant lighting. In most cities, bridges are a faster route for everyday commute and in need of constant lighting makes this an efficient way to produce natural energy.

CONCLUSION

Our work and the results obtained so far are very encouraging and reinforce the conviction that solar cum vertical axis wind energy conversion systems are practical and potentially very contributive to the production of clean renewable electricity from the wind even under less than ideal sitting conditions. It is hoped that they may be constructed and used at high-strength, low- weight materials for deployment in more developed nations and settings or with very low tech local materials and local skills in less developed countries. The Savonius wind turbine designed is ideal to be located on top of a bridge or bridges to

generate electricity, powered by wind with solar panel. The elevated altitude gives it an advantage for more wind and sun power opportunity. With the idea on top of a bridge, it will power up street lights and or commercial use. In most cities, bridges are a faster route for everyday commute and in need of constant lighting makes this an efficient way to produce natural energy 24x7 and in all seasons winter ,summer,mansoon too.

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