

# Survey on Renewable Energy Sources

<sup>1</sup>Ms. Jadhav Reshma Suresh, <sup>2</sup>Mrs. Patil Sangita B.

<sup>1</sup>P.G. Student, <sup>2</sup>Assistant Professor  
Department of Electrical Engineering,  
GHRIET, Wagholi, Pune, India

**Abstract:** In past several decades the energy consumption is rapidly increases. The huge consumption of fossil fuels has caused damage to the environment. Therefore, our technologies are largely depending on natural resources. This paper presents survey on types of renewable sources and hybrid system. This work is related to types, advantages and disadvantages of single renewable energy source and the combination of two energy sources.

**Index Terms:** Renewable Energy, Solar Energy, Wind Energy

## I. Introduction

Electricity generation is made by using non-renewable energy sources and renewable energy sources. But the way to generate electricity by renewable sources is good. Total world's Energy generated from 80% fossil fuel, 10% bio fuels, 5% Nuclear and 5% renewable. Only 18% of that energy was in the form of electricity but 82% was only for heat and transportation. Fossil fuels are importance because they can be oxidized, producing specific amounts of energy per unit mass. Fossil fuels pollute the environment and also these are nonrenewable sources. This process is very dangerous and difficult. The huge use of fossil fuels has caused damage to the environment in various forms. It creates lot of environment problem and finally our biogeochemical cycle will be affected. The energy field needs to get more from existing fields while continuing to search for new resources. Due to technological advancement hybrid vehicles are made. For improvement of energy field solar and wind can be playing important role. There are many types of renewable energy sources. For example, Solar energy, wind energy, tidal energy, geothermal energy etc. The renewable energy sources are never run out this is one advantage. This energy required less maintenance, also it save money. Another advantage is numerous health and environmental benefits. They provide clean energy because they are non-contributed to greenhouse effects and global warming.

The solar energy is the energy obtained by capturing heat and light from the Sun. The photovoltaic method is used to obtaining electricity from sunlight. This is achieved using a semiconductor material. The other method is to obtaining electricity from sunlight is through thermal technologies, that is first is solar concentration and second is heating and cooling [1]. Wind has been used as a source of power for thousands of years for such works as propelling sailing ships, grinding grain, pumping water, and powering factory machinery. Bio-energy also called biomass. Biomass contains stored energy, because plants absorb energy from the sun through the process of photosynthesis. Biomass is an organic working on solar radiation storage material, and then converted into chemical energy. Biomass is being considered as an important energy resource all over the world. Biomass is used to generating electricity, fueling vehicles and providing process heat for industries. In renewable sources of energy, biomass is single source as it effectively stores solar energy. Biomass is the only renewable source of carbon that can be converted into convenient solid, liquid and gaseous fuels through different number of conversion processes. There are no all renewable energy sources come from sun. Geothermal Energy resource is heat from within the earth. Steam and hot water inside the earth we can use for generation of electricity and to heat building. Due gravitational attraction between sun and moon the changes in periodic level of ocean water and associated tidal currents are done.

## II. Advantages of Renewable energy

### 1) Safe and clean form of Energy

High-power loads apply to all forms of renewable energy. The collection and process is safer than non-renewable energy methods. For Example, when we are using wind or solar energy, for then we don't have to worry about the hostile of a nuclear meltdown or particulate pollution from thermal power plant.

### 2) It is an ample form of energy

We have enough sunlight that falls on our planet every day. Energy of sunlight is an ample form. We do not have the resources to collect that energy. Wind provides us sufficient energy with constant energy resources. Because of the moon tides always moving. Geothermal energy is also available in bulk because of internal mechanism of our planet.

### 3) Renewable energy can be collected in multiple location simultaneously and in multiple formats.

Every type of renewable energy source used at many locations at one time. For example, Hydro power plant exist in huge number in our country.

### 4) Stable form of energy

The power produced from all types of renewable energy is stable and useful as compare to nonrenewable energy.

### III. Availability of renewable energy sources

#### 1) Solar Energy

Sun is an unlimited source of energy which is available at no cost. The most important benefit of solar energy over conventional power generators is that the sunlight can be directly converted into solar energy by using PV Cell. As compare to fossil fuels and oils solar energy is free reachable to common people and available in large quantity.

Solar energy can be converted into other form of energy such as heat and electricity. It is used to heat a fluid such as water in solar collector. Also solar energy is used to generate the electricity in photovoltaic cell. [1]

#### Photovoltaic Cell:

PV Cells convert the sunlight in to electricity. PV cells are used to power your calculator. PV Cells are made of semiconductors. Photovoltaic is the conversion of light into electricity. Because of photoelectric effect photons of lights absorbs and release electrons and these electrons are captured, electric current results that can be used as electricity. When photons strikes a photovoltaic cell, they may be reflected pass right through and or be observed. Only observed photons provide energy to generate electricity. Fig 1 shows general procedure of solar energy conversion in to electricity.

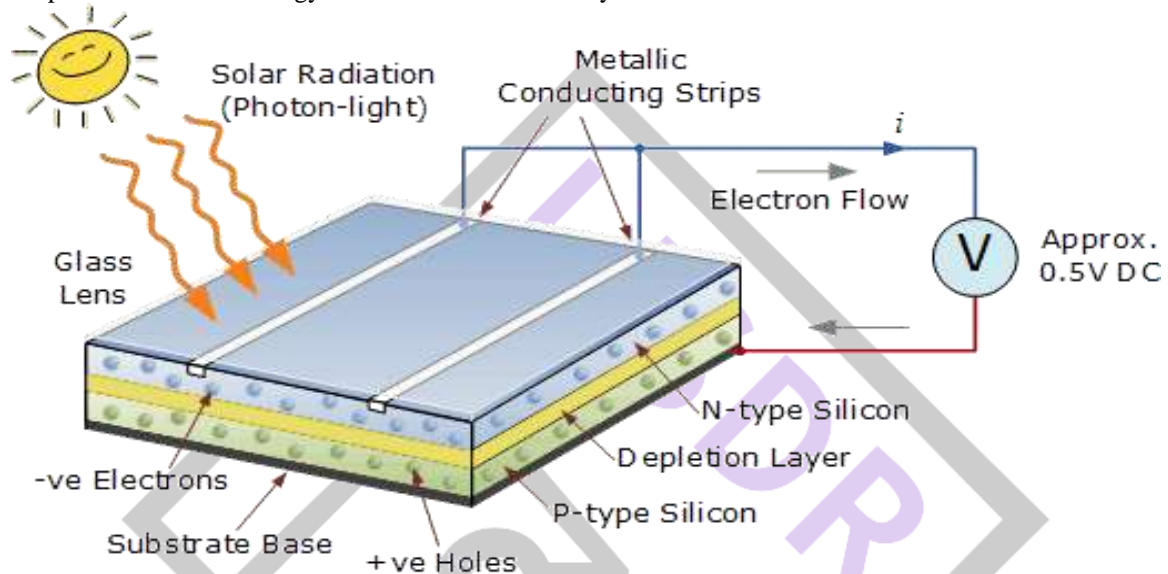


Fig.1. PV Cell

Solar Energy can be classified as two types 1. Passive solar and 2. Active solar. Passive solar system depends heavily on the construction and design of your home. Passive energy systems use the sun’s energy for cooling and heating purposes.

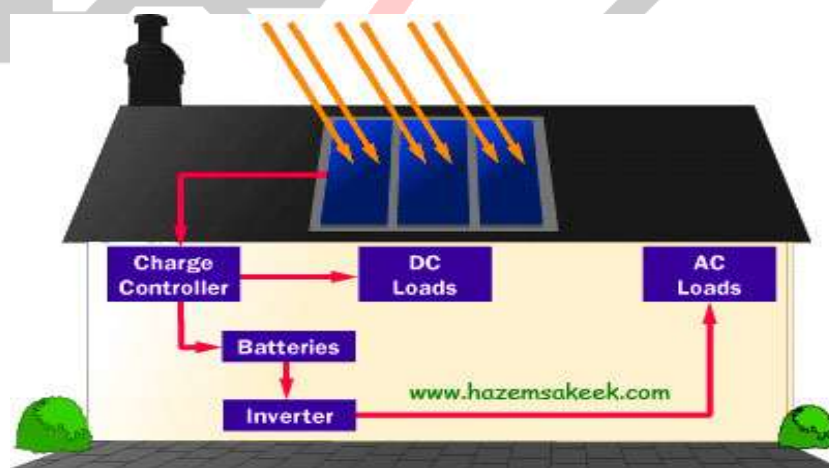


Fig. 2. Solar energy mechanism at the unit

Passive solar systems operate without reliance on external devices. In this system passive collectors are used, which are based on law of thermodynamics. It is good for our health. The efficiency directly depends on the weather. Indirect use of Energy is possible only in building (or) structures which is shown in fig2.

Active solar systems use hot water pumps or fans to pump fluids. By using these system effectiveness of the solar system increases. Active solar panels depend on external energy sources only. In this system solar collectors are used to store and conduct energy. For this system one drawback is the required equipment are very expensive.

Active Solar Energy is the use of the sun’s Electro magnetic radiation in generating Electrical Energy. This is used in calculators, watches shown in fig 3.

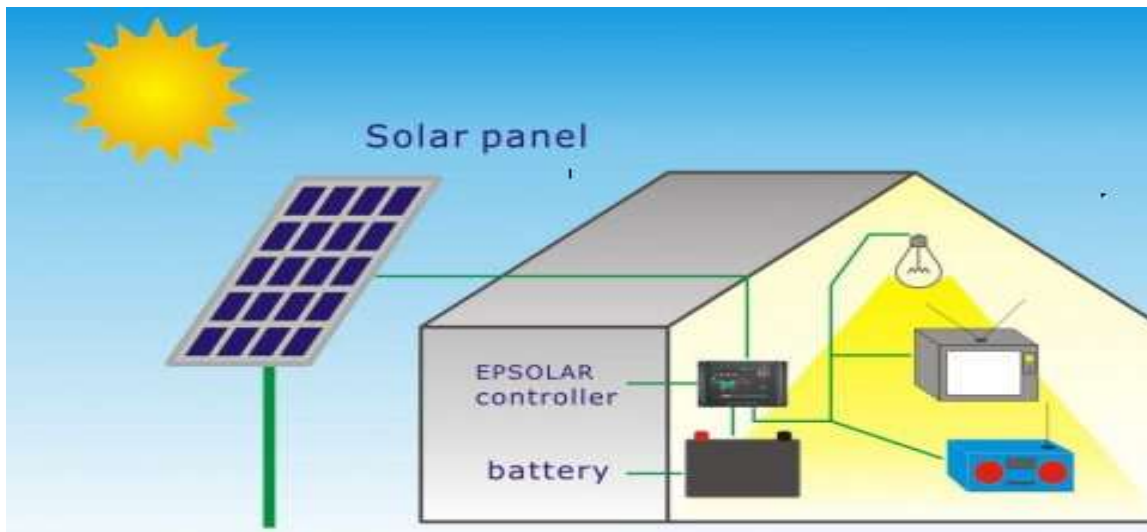


Fig.3. Solar energy at small unit

**2) Wind Energy**

Wind energy is another way to collect energy and convert it in to electricity. In past years’ wind turbines were used to grind grains into flour, hence the name windmill. The classification of wind turbine based on axis around which the turbine blades rotate 1) horizontal axis wind turbines (HAWT) 2) vertical axis wind turbine(VAWT). Fig 4 shows the diagram of HAWT and VAWT. The advantage of vertical axis machines, such as the Darrius rotor, is that they don ‘t need any kind of yaw control to keep them facing into the wind. [2]

A second benefit is that the heavy machines contained in the nacelle (the housing around the generator, gear box, and other mechanical components) can be located down on the ground, where it can be serviced easily. The disadvantage of this turbine is relative speed of blades is low, also wind near the ground is turbulent. As we know power developed in windmill is cube of speed so power developed by VAWT is low as compare to HAWT. [3]While almost all wind turbines are of the horizontal axis type, there is still some controversy over whether an upwind machine or a downwind machine is best.

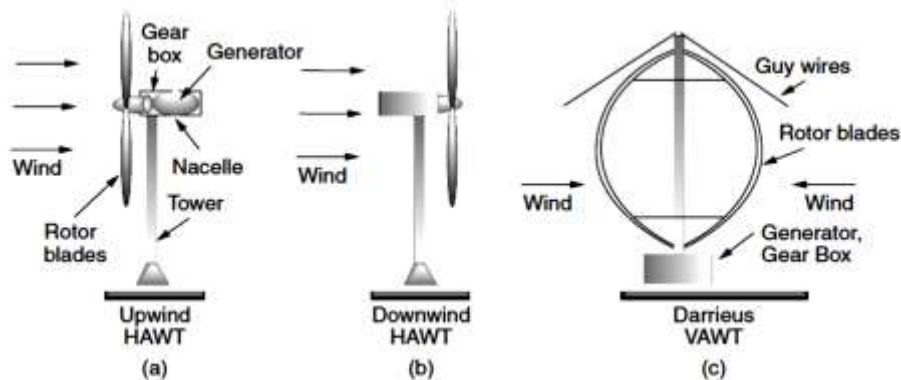


Fig.4. Types of wind Turbines.

**3) Biomass Energy**

In life cycle Biomass is a carbon neutral resource and the primary contributor of greenhouse effect. All over the world Renewable biomass is being considered as an important energy source. Biomass is used to obtaining variety of energy like generating electricity, fueling vehicles and providing process heat for industries. When we compare all renewable sources of energy, biomass is unique because it is effectively stores solar energy. By using different conversion process biomass energy which is source of carbon can be converted in to convenient solid, liquid and gaseous fuels .Biomass is the word used for all organic material which is originating from plants (including small plants), trees and crops. Mostly, it is organic material produced by the photosynthesis of light. By photosynthesis effect sun’s energy collected and stored in biomass. In Biomass energy plant biomass is converted into useful forms of energy such as heat, electricity and liquid fuels. Biomass has various advantages such as- Biomass is a renewable energy, potentially sustainable and relatively environmentally friendly source of energy. Biomass fuels have very negligible sulfur content and, therefore, do not contribute to sulfur dioxide emissions that cause acid rain. Biomass is one of the amplest and well-

utilized sources of renewable energy in the world. The chemical material (organic compounds of carbons) are stored and can then be used to generate energy. The most common biomass used for energy is wood which obtain from tree. Wood has been used by humans for producing energy for heating and cooking for a very long time.

There are types of biomass

- 1) Agricultural biomass
- 2) Biomass from animal waste
- 3) Forest biomass
- 4) Municipal waste
- 5) Energy plantation
- 6) Marine biomass.

### 3) Tidal Power

By the relative motion of the Earth, Sun and the Moon, which interact viagravitational forces tidal energy is generated., are Due to the gravitational attraction by the Sun and Moon periodic changes of water levels, and associated tidal currents are made. By changing position of moon and sun relative to earth, the magnitude of the tide is changes. [5]

Properties of tidal turbines

Tidal streams offer entirely predictable output (unlike wind and wave power). Typically, tidal turbines are similar in appearance to wind turbines, are mounted on the seabed. But as compare to wind turbine tidal turbines are designed to use the higher energy density, but lower velocity. Tidal stream differs from established technology for exploiting tidal energy in that tidal flows are not captured and controlled by means of a large dam-like structure.

Tidal turbines are operating in the free flow of the tides. Meaning that large construction costs and disruption of estuarine ecosystems associated with barrages may be avoided. However, as tidal streams are a diffuse form of energy and the purpose of the barrage is to concentrate tidal flow, this also means that large numbers of turbines, spread over relatively large areas of seabed, are required if significant amounts of energy are to be extracted.

### 4) Geothermal Energy

If you were to dig a big hole straight down into the Earth, you would notice the temperature getting increases the deeper you go. Therefore, inside of earth is very heated. This heat is called geothermal energy.[6]

People can capture geothermal energy through by two ways:

- 1)Geothermal power plants: In this plant heat from deep inside the Earth to generate steam to make electricity.
- 2)Geothermal heat pumps: In this plant which tap into heat close to the Earth's surface to heat water or provide heat for buildings.

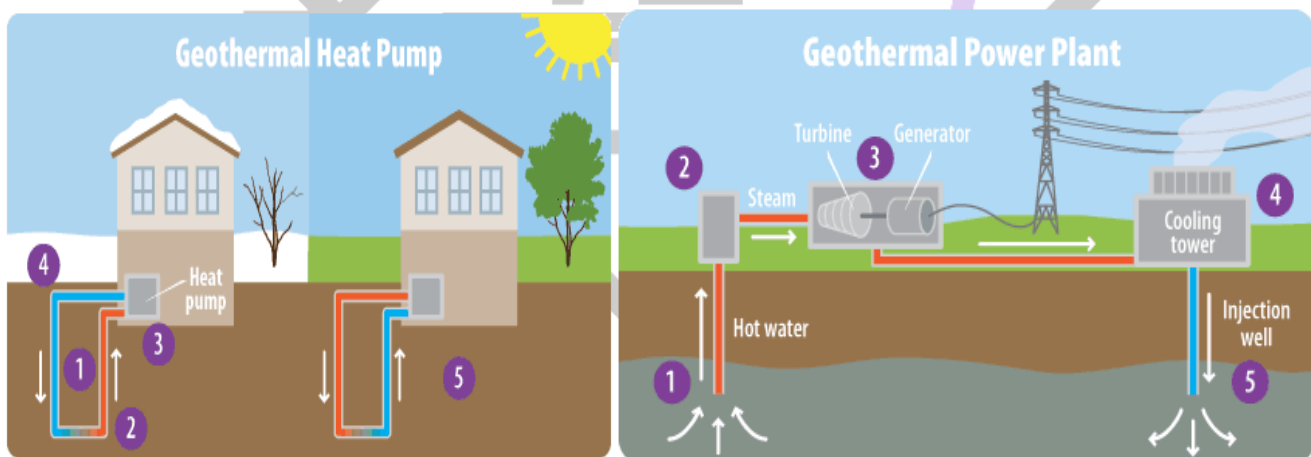


Fig.5. Geothermal power plant and heat pump

### IV. Hybrid System

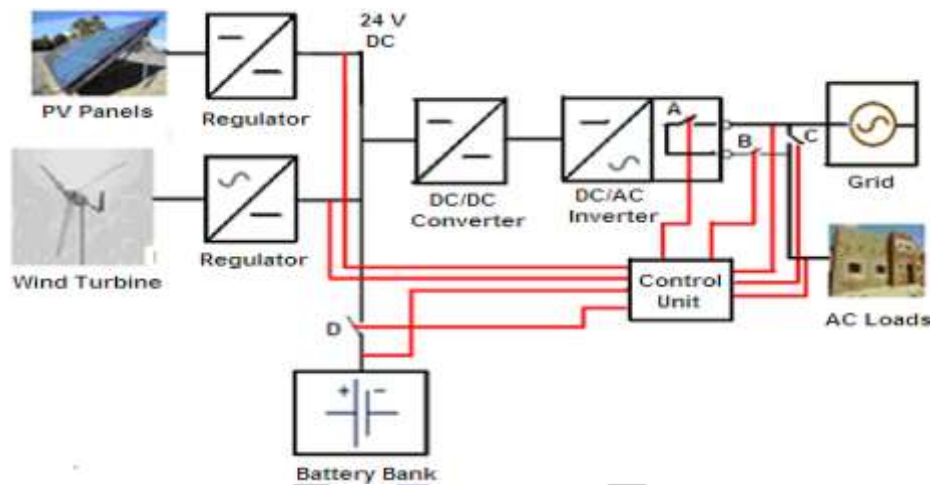
Hybrid system can operate both as an autonomous system and grid connected system. Control and design of power electronics circuits are main part of this system. [7]

### V. Proposed Work

#### Solar Wind hybrid system

In practical performance we note number of network failures and a limitation of renewable energy part due to random nature of renewable sources availability. A hybrid energy system can be defined as a combination of different energy supply systems at the same place. The objectives of design are cost and CO<sub>2</sub> gas emission minimization. In hybrid system there are various possibilities

to make combination of different energy sources. In hybrid system selection of energy sources is depends on the source availability at particular area. [8] In India mostly solar energy available in almost all types of places. Therefore, most of times one of the energy source in hybrid system is solar energy. Number of combinations are available like solar –wind, Solar-Hydro, etc. are done. In this system DC/DC, DC/AC, AC/DC Convertors are used. In this system the PV panel and wind turbine generators are used as the main power generator. In hybrid system batteries are required for storing purpose. [1] A block diagram of hybrid power system of this is shown in diagram.



**Fig.6. Block Diagram of PV and Wind turbine hybrid system**

### Conclusion

In this work, we have learned types of renewable energy sources and also introduction to hybrid system. Hybrid power system which consists of wind turbines and photovoltaic panels is designed to operate either grid-connected or without grid connection. Hybrid system has advantages over single source of renewable source. To evaluate this, we proposed above PV/Wind Hybrid system. Through the recently developed control unit, it is possible to check the energy demand from autonomous charges, the energy level of grid, the state of charge of batteries, and the system can operate either autonomously or grid-connected within the frame of control unit.

### Acknowledgment

We would like to thank all the authors of different research credentials discussed in writing this paper. I am also thankful to Ms.Patil Sangita B. Assistant Professor,G.H.Raisoni Institute of Engineering&Technology,Wagholi,Pune for her motivation and support. It was very knowledge achievement and cooperative for the advance exploration to be done in future.

### References:

- [1].KivancBasaran , NumanSabit Cetin, SelimBorekc “Energy management for on-grid and off-grid wind/PV and battery hybrid systems”
- [2].Pranav Sarda, Rahul Sahu, DeepanshuShende, Yash Jain“Design And Development of Alternate Sources of Energy Using Wind Turbulence Created by Moving Vehicles on Highway by Using VAWT’S”2018,IJET
- [3].Xing ia Yao ,Shu Liu and Xiaodong Wang “Research on Maximum Wind Energy Capture Control Strategy”,2010 IEEE, International Conference on Optics, Photonics and Energy Engineering
- [4].Gang Shi, Jianwen Zhang, Xu Cai, Miao Zhu “ Decoupling Control of Series-Connected DC Wind Turbines with Energy Storage System for Offshore DC Wind Farm”
- [5].RoslynnRosli\*, Eric Dimla“ A review of tidal current energy resource assessment:Current status and trend” 2018 IEEE,international Conference on Renewable Energy: Generation and Applications (ICREGA)
- [6].AurelSetel, MirceaGordan, Cornel Antal, Dana Bococi “Use of Geothermal Energy to Produce Electricity at Average Temperatures” 2015, IEEE International Conference on Engineering of Modern Electric Systems (EMES)
- [7].PranitaRathod, Amit Chavhan“Performance Analysis of Hybrid Renewable Power System with Simulation”2015 IJSR
- [8].Jaiganesh, K., Duraiswamy, K.: ‘Dump power control techniques for standalone hybrid wind/solar power generation control’. Int. Conf. on Emerging Trends in Science, Engineering and Technology (INCOSSET), Tamilnadu, India, 13–14 December 2012, pp. 422–428

- [9].Kalantar, M., Mousavi, S.M.G.: 'Dynamic behavior of a stand-alone hybrid power generation system of wind turbine, microturbine, solar array and battery storage', *Appl. Energy*, 2010, 87, pp. 3051–3064
- [10].Shi, Y., Li, R., Xue, Y., et al.: 'High-frequency-link-based grid-tied PVsystem with small DC-link capacitor and low-frequency ripple-free maximum power point tracking', *IEEE Trans. Power Electron.*, 2016, 31, (1), pp. 328– 339
- [11].Suthar, M., Singh, G.K., Saini, R.P.: 'Comparison of mathematical models of photo voltaic (PV) module and effect of various parameters on its performance'. *Int. Conf. on Energy Efficient Technologies for Sustainability (ICEETS)*, Nagercoil, India, 10–12 April 2013, pp. 1354–1359
- [12].Villalva, M.G., Gazoli, J.R., Filho, E.R.: 'Comprehensive approach to modeling and simulation of photovoltaic arrays', *IEEE Trans. Power Electron.*, 2009, 24, pp. 1198–1208
- [13].Balasubramanian, G., Singaravelu, S.: 'Fuzzy logic based controller for a stand alone hybrid generation system using wind and photovoltaic energy', *Int. J. Adv. Eng. Technol.*, 2012, 3, pp. 668–679

