

A Speculative Approach to Design A Hybrid System for Green Energy

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Abstract: Now a day's demand of energy is increasing all over the world. Because of this demand the fossils fuels are reducing day by day to meet the requirements of energy in daily life of human beings. It is necessary to balance the situation for the increasing energy demand by taking an optimistic overview about the natural renewable energy sources like sun, gust, hydro etc.,. These energy sources only can balance the situation of unbalancing between fossil fuels and increasing energy demand. Renewable energy systems are suitable for off grid services in power generation, to provide services to remote areas to build complex grid infrastructures. India has the abundant source of solar and wind energy. Individually these energy sources have some own advantages and disadvantages; to overcome the disadvantages of individual energy sources we can combine all these sources to make an efficient renewable source nothing but hybrid renewable energy source. In this paper we proposed a hybrid model which is a combination of four renewable energy sources solar, wind, RF signal and living plants to increase the energy efficiency.

Keywords: Green Energy, Solar Energy, Wind Energy, Radio Frequency (RF) Energy, Hybrid Renewable Energy System (HRES).

1. Introduction

Continuous Consumption of energy from fossil fuels reduces the natural sources like coal, oil and natural gas and increases the global warming. In India, 80% of power produced from thermal power plants. But the problem of thermal power plant is to create the pollution in environment and the cost of the coal material is high. In nuclear power plant, the power produced by using uranium, plutonium. But the main disadvantage of nuclear power plant is, it creates very big problem when any component is failed [3].

Table 1 Grid Connected Installed Capacity from all Sources as April 2016

Source	Installed Capacity (MW)	Share
Coal	187252.88	61.12%
RES MNRE	44236.92	14.14 %
Large Hydro	43112.43	14.07 %
Gas	25057.13	8.18 %
Diesel	918.89	0.30 %
Nuclear	5780.00	1.89 %
Total	302833.00	100.00 %

Table 2 Renewable Power Capacity in India as of Sept., 2016



Source	Total Installed Capacity (MV)	2022 Target (MV)
Wind Power	28082.95	60000.00
Solar Power	8513.23	100000.00
Biomass Power	4882.33	10000.00
Waste Power	115.08	
Small Hydro Power	4323.35	5000.00
Total	44783.33	175000.00

From table 1 it is clear that the more electrical energy is produced by coal which is not a renewable energy sources. As the time passes the amount of coal is depleting day by day. That is the main reason to shift towards the renewable source of energy. The table shows that the main production of electricity is done by coal having share of 61.2% of the total requirement of electricity [1-5]. The table 2 shows the total energy production from different renewable energy sources [1-5].

Renewable energy generation is eco-friendly and reasonable capital cost and which will play an important role in future energy supply. These technologies include energy generation from natural sources, like wind, solar, RF signals, biomass, ocean wave tides and plants. These above energy sources have their own advantages, such as reduced carbon dioxide emission, improved power quality and reliability. The only problem with these types of sources is that these are intermittent in nature i.e continuous energy supply is not at all possible from an individual source and therefore, hybrid combinations of two or more energy generation systems, along with regular storage can improve system efficiency [7].

2. Green Energy Sources

We can get the energy from our natural resources which are available in the universe. This type of energy is plentiful and obtainable with a free of cost. These energy sources are called green energy sources or renewable energy sources. Examples of energy sources are biomass energy, wind energy, water energy, solar energy, geothermal energy and living plant energy. Rather than this some of the energy sources are limited and cannot available in definite amounts and these are known as non-renewable energy sources [8-9].

2.1 Biomass Energy

Biomass energy is the energy obtained from the organic matter of the trees. Ignited material like wood, waste and other plant matter releases stored chemical energy in the form of heat, which can be used to turn shafts to produce electricity [8-9]. The figure 1 shows how biomass energy is produced.

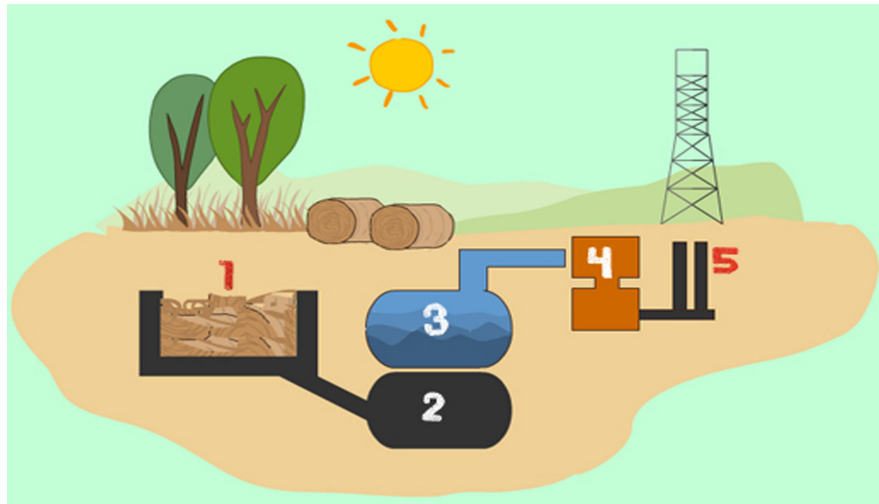


Figure 1 Production of Electrical Energy from Biomass Energy

1. Plants consume the energy from the sun and stored. Whenever these plants are cut or died then this waste stuff collected from the plants is sent to the bunker.
2. To release heat energy this stuff is burned in a boiler and it collects the energy as steam.
3. The turbines with pipes are used to collect the heat energy.
4. The steam collected is turned into a number of blades in the turbine and generators, which are made of coils and magnets.
5. Then the charged magnetic fields produce electricity, which is sent to homes by cables.

2.2 Wind Energy

Wind energy is obtained by huge convection currents in the Earth's atmosphere, due to the heat energy produced by the sun. This means as long as the sun shines, there will be wind. The moving wind has the kinetic energy in large amounts. This can be converted into electrical energy using wind turbines. The wind turns the blades, which spin a shaft, which is connected to a generator and produces electricity. The produced electricity is collected and transferred to homes, industries and different other areas as per the need through the transmission lines and distribution lines [8-9]. Wind turbines may damage if the wind speed is very high but if there is no wind the turbines cannot work.

2.3 Water Energy

Moving water has kinetic energy and this is useful in converting into electricity in various methods. Usually the water collected during heavy rains and floods are stored in the dams and whenever the water falls high from the dams it produces gravitational potential energy [8-9]. As the water flows speedily through the pipes this stored energy is converted to kinetic energy and turns into electricity as shown in figure 2.

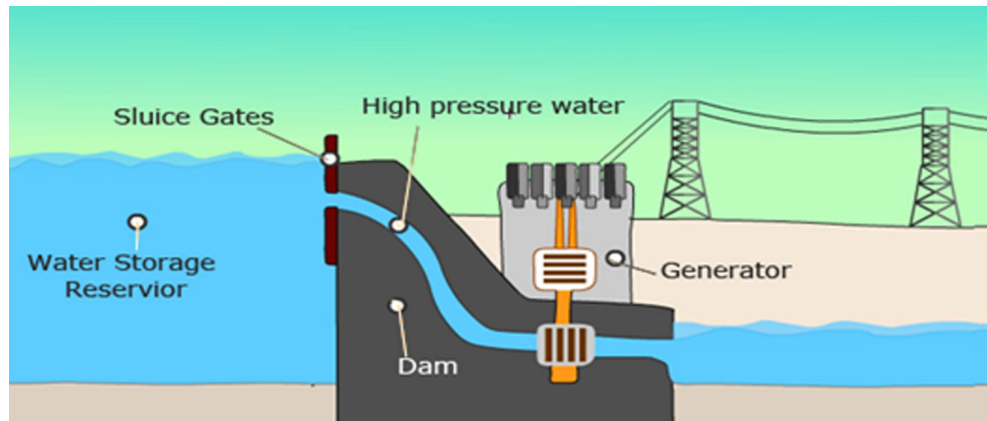


Figure 2 Production of Electrical Energy from Water Energy

2.4 Geothermal Energy

Geothermal energy is produced with the help of steam available in molten rocks. These molten rocks found deep into the earth's crust about 1800 miles which are nothing but rocks in a liquid state due to extreme heat under the earth. These rocks which are in the liquid state are very hot so that to keep water and air about 50-60 degrees. The places with hotter 'close-to-earth-surface' temperatures, deep wells can be drilled and cold water pumped down. Then the water runs through the cracks of the rocks and is steam up and the steam energy is returned to the surface and driven into the turbines and electricity generators as shown in figure 3 [8-9].

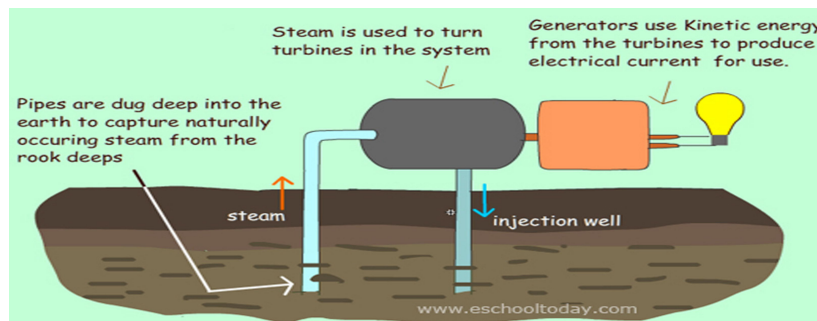


Figure 3 Production of Electrical Energy from Geothermal Energy

In other places, a geothermal heat pump system consisting of pipes and pumps buried in the earth can be used to heat homes. This can be explained by the above figure. As the pipes are dug into the deep wells beneath the earth and the collected steam is passed through the turbines and the produced kinetic energy by the turbines used by the generators to produce electricity.

2.5 Solar Energy

Solar energy is obtained from the sun. In Latin solar means sun. It is the basic energy source which is used from many years as it is plenty enough and couldn't imagine life on the earth without solar energy. The solar energy is used to produce the electric energy by the devices called solar cells which are exploited by the modern technology as shown in figure 4 [8,9].

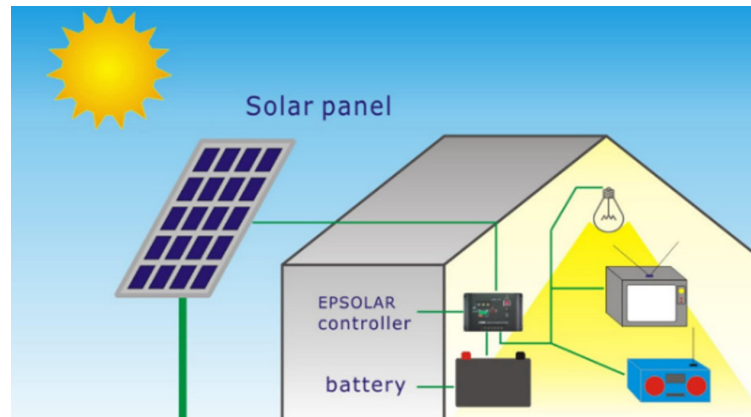


Figure 4 Production of Electrical Energy Solar Energy

2.6 RF energy

The work done capability is provided from chemical or physical resources utilization from this power is derived it proves that air contains energy. Something has energy if it is not in absolute zero. In other words every moving particle has energy. The air molecule mass is converted into energy in Einstein point of view. All these naturally obtaining energy sources can be connected through a modern RF technology that produces millions of watts of power into atmosphere. The production of electrical energy from RF energy is shown in figure 5. This RF energy is steady state in bands like AM and FM and also even in wider bands for spread spectrum which depends on the tunes circuits that can extract energy from the EM fields related to RF transmissions [10,11].

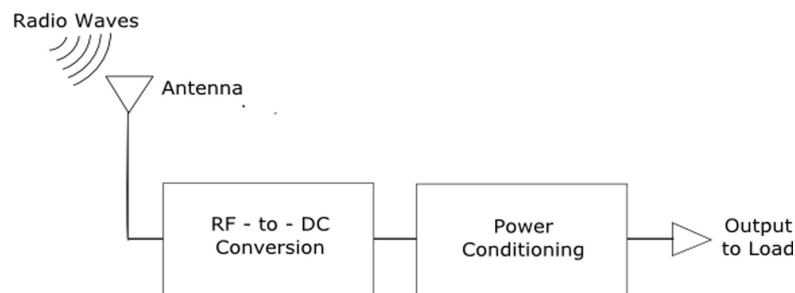


Figure 5 Production of Electrical Energy from RF energy

Nowadays radio transmitters count increasing for handsets and base stations. ABI Research and ITU estimates number of subscriptions for mobile broadband. From single location hundreds of WI-FI access points are detected in urban areas. A tiny amount of energy can be harvest at power level 50 to 100 mW from WIFI router at short range. For long range it requires high gain antenna to harvest RF energy. Ambient harvesting of RF energy is demonstrated by power cast at 5kW AM radio station in 2005.

2.7 Living Plant Energy

The living plants utilize the natural solar energy from the sun for the purpose of photosynthesis. The photosynthesis is the natural process of converting light into chemical energy. Then the plant can produce organic matter as their food. The whole organic matter is not used by the plants but a part of it is secreted into the soil through the roots and the naturally existed

microorganisms will break down the organic matter to obtain energy. In this process electrons are released as a waste product and by accommodating an anode for the microorganisms electrons can be extracted to produce electricity as shown in figure 6[12, 13].

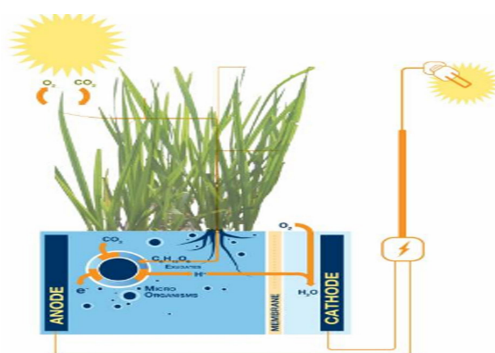


Figure 6 Production of Electrical Energy from Living Plants

3. Hybrid Green Energy Systems

Hybrid Renewable Energy System (HRES) is the combination of two or more renewable energy resources with some conventional source (diesel or petrol generator) along with storage, in order to satisfy the demand of a geometrical area as proposed by many researchers. The researchers working on hybrid systems with the combination of two energy sources those are wind and solar which is shown in figure 7 [14-16].

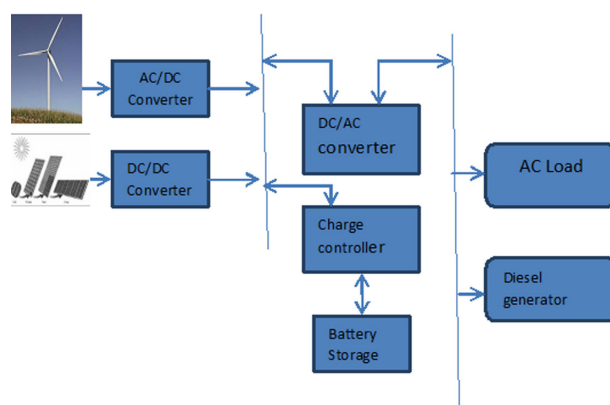


Figure 7 HRES for Solar energy and Wind Energy

In this diesel generator is used as a conventional source for the startup of the entire system. Here electricity is produced by wind mill and Solar PV arrays. But these two have their own limitations (During night the solar energy is less and in day time the wind speed is low). In Some specific climatic conditions both energies are very low. To overcome these types of problems a new hybrid model is proposed which is the combination of solar, wind, RF signal and living green plants. RF signals can produce energy continuously according to the research of ABI and living plants can generate chemical energy by photo synthesis, so we added RF signal block and living plants block in the proposed model. The proposed hybrid system efficiency can be far better than existing hybrid model. Figure 8 shows the proposed hybrid renewable energy system. In this model each individual energy source is connected with

inverter/controller block along with a relay block. The relay block controls the energy from each block.

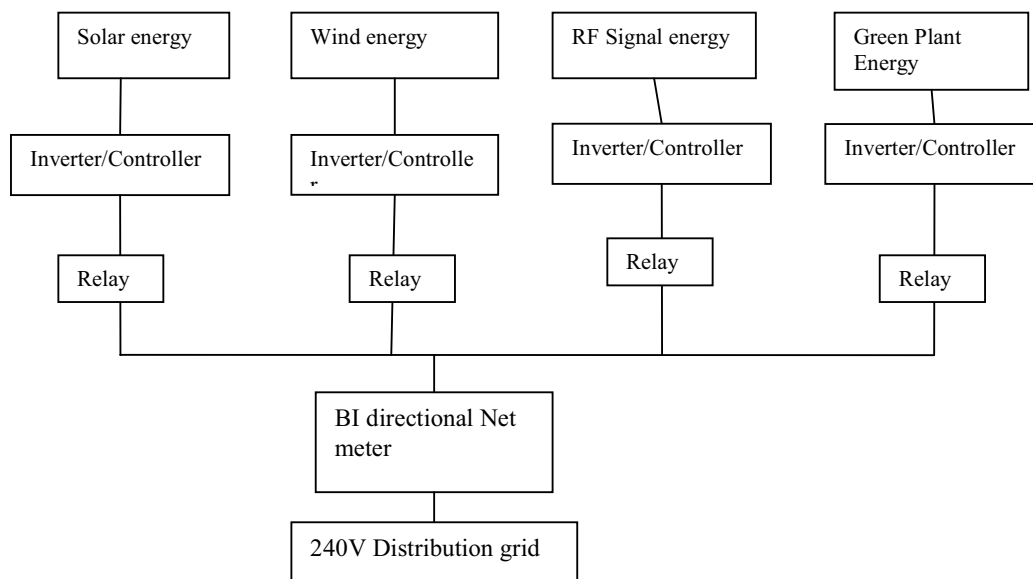


Figure 8 Proposed Hybrid Renewable Energy System (Solar +Wind + RF+ Living Plants)

4. Conclusion

In India, electric energy demands are increasing day to day. The depleting fossil fuels cannot meet the demands so we are pushed to generate new and new energy sources. This paper gives an overview of hybrid renewable energy systems. Hybrid energy generation is the proper solution to cop up with the upcoming demands. The paper concerns with the Importance of the renewable energy sources specifically the solar, wind, RF Signal and living Plants. The need for their combination to make a hybrid system so that they can counteract each other's drawbacks and come up with a solution to tackle the limitations of the seasonal variations. This will increase the overall efficiency of the system.

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