Solar Power System And Wind System With Fuel Cellbackup Source For Hybrid Power System Application

Mr.J.Shanmugasundaram[1], P.Nivetha[2], J.Nandhini[3]
[1, 2] Assistant Professor, Dept of Electrical and Electronics Engineering
[3]Dept of Electrical and Electronics Engineering
[1, 2, 3] Vivekananda College Of Engineering for Women, Namakkal, Tamilnadu, India

Abstract- *The demand for electric power is increasing day by day throughout the planet. In such a scenario typical sources of power might not meet the requirement. The importance of renewable power sources is taken into account because the various appropriate energy sources today. This paper deals with the simulation of the solar energy system that is that the main supply which contains a cell backup power supply. Therefore, no charge device is interfaced. The projected methodology has four major parts: photovoltaic cell because the main offer, cell as a backup supply, the management device for change power from the most supply to backup supply and the other way around and therefore the final half may be a load.*

The load is energized by the alternative energy directly through the management device. once the solar energy is lean regarding the demand, then the load gets power from the cell through the management device. However, if the solar energy becomes adequate to supply power to the load, the management device changes over the supply from fuel to photovoltaic cell. the end result of the simulation shows that the load invariably gets associate degree uninterrupted power offer. the entire simulation has been accomplished mistreatment MATLAB Simulink surroundings (Math Works, Inc. USA).

Keywords- solar cell, hybrid power system, fuel cell, renewable energy source, control device.

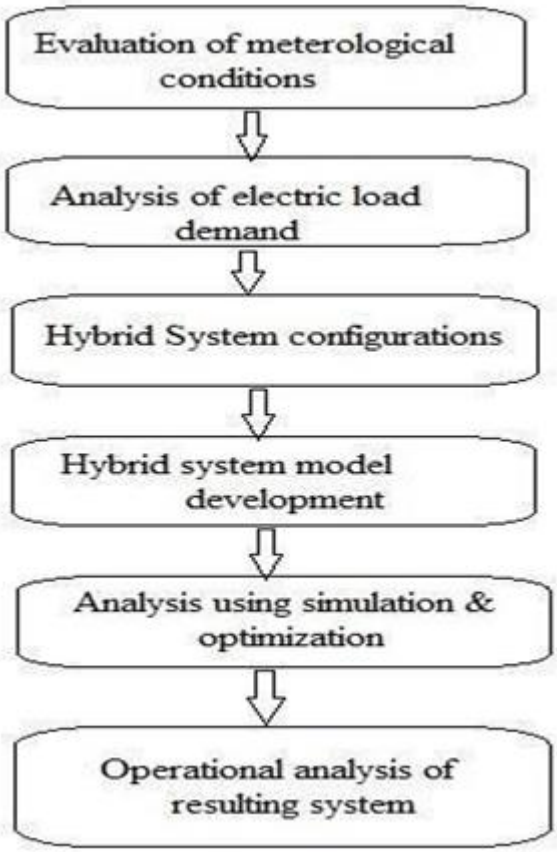
I. INTRODUCTION

The consumption of current has accumulated several folds everywhere the globe thanks to its many advantageous options. restricted fuel resources and their impact on the surroundings forced the researchers to explore energy sources . the choice energy supply is mostly outlined as any power supply that's not supported fossil fuels or nuclear reactions that embrace power generation from solar power, fuel cell, geothermal, biomass, plant matter, and mini-hydropower, etc. the most blessings of those renewable energy sources ar that they're pollution free, inexhaustible and simply accessible. The solar energy has been among the quickest growing sources of energy for the last decade within the developing countries. the explanations for this widespread and growing usage of solar energy are its low maintenance, substantial environmental blessings, and validatory energy policies .For development of associatey country energy plays an vital role. It is terribly essential half of growth & economy of country. Our primary supply of generating energy is from coal, oil and natural gas. As we have a tendency to all grasp that energy is required for industrial, agriculture, business and domestic purpose. World's energy demand is increasing day by day. There are several sources of generating energy from coal, fossil fuels, oil and alternative gases. however all these thusurces are harmful to the surroundings so that there are limitations of victimization these sources and they are restricted. thanks to warming and pollution in surroundings we'd like clean energy supply. In today's world all focus is on Eco inexperienced energy, means that generating energy while not harming surroundings. In that case we've got choice of renewable energy sources like star, wind, little hydro & biomass, bio-fuel etc. Renewable energy is having terribly a lot of potential to come through energy demand. however there are conjointly some difficulties occur to use these energy sources, several analysis goes on to enhance the potency of renewable energy supply. as a result of main aim is to conserve the natural resources, create system to avoid international warming & carbon emission. Generating energy from renewable supply rather than coal or fuel are price effective to the country. If we have a tendency to use this renewable supply to come up with energy it's expected that it'll scale back CO2 emission . As mentioned on top of there ar several renewable energy sources however wind& star energy is most outstanding. as a result of if we have a tendency to speak regarding renewable energy supply the initial thought is regarding wind- star, it is well glorious supply of energy and wide distributed everyplace. Single supply of energy like wind & PV isn't whole reliable thanks to global climate change or sunshine in night hours or season and wind speed variation .

Normally wind & solar power are individually accustomed generate power however each are having some losses.

Like the environment is changes daily the climate changes have an effect on these systems, star radiations are not consistent and wind speed varies each time thus it have an effect on the system & its performance. no matter price need for putting in single system it'll reduced up to some extent during this mix hybrid system. thus rather than victimization single system, if we have a tendency to mix these 2 it'll facilitate one another to beat losses. Like once sunshine hour's star PV system can generate electricity and wind rotary engine system can extract energy from wind supply. once wind conditions don't seem to be sturdy enough to supply power that point its have backup to meet load demand & which will generate from the scheme. For a lot of convenience of hybrid wind-solar system several man of science have used totally different mixtures to form system a lot of reliable.

They used combination of wind-solar and alternative sources like diesel/wind/PV, wind/diesel, and PV/diesel hybrid system There are some basic steps that have to be compelled to follow for style and designing of system.



However, in developing countries, the solar power is utilized with other energy sources like FC, hydroelectric power for power generation. Under low irradiations level, a solar cell converts solar energy into the electrical energy very slowly, approximately 30-40%. To take over the fossil hydrocarbons combustion, the fuel cells technologies are developing nowadays, which have been emerged as a promising alternative to clean energy for industrial and residential applications. The power converters are required to interface the FC system with other renewable energy sources and load applications. Many methods have been made regarding solar cell based hybrid system. In that other energy sources used in hybrid power systems with the solar cell are wind energy, geothermal, biomass, plant matter, and mini-hydropower, etc. Sometimes the solar panel is one of the best options to be used along with the grid . In most of the cases, there is a storage system with the solar cell. In a typical hybrid system having a solar cell, solar power energy is at first stored in the storage system.

Then from the storage system, the power is further utilized. A solar power system was invented by Miguel A . The inventor did not use any kinds of longtime backup system with the solar cell rather he used capacitors to reduce the variation of the output of the solar panel. In this case, the load will be supplied only when there is sufficient solar power. If the solar panel output reaches to zero the capacitor cannot provide a charge for a long time as a backup of the solar panel. Another solar power system was invented by Kosuke Harada, Katsuaki Murata, and Takazi Nakamizo .In their system, they supplied the solar power to the load without using any charge storage system but the inverted the solar power before feeding to the load with the help of a voltage controlled oscillator. They also did not use any backup power sources to supply the load in case of insufficient solar power. Solar cell and fuel cell based hybrid power systems are practical options for future power generation. They are free of recurring costs. They can also supply power for remote areas, where grid power is not present. In this paper, a hybrid model of solar and fuel cell is developed. That is why the work of this paper is significant.

This paper is contributing to the research area of nonconventional hybrid power systems by proposing a new idea of using solar energy without any storage devices with a fuel cell as a backup power source.

II. HYBRID WIND-SOLAR

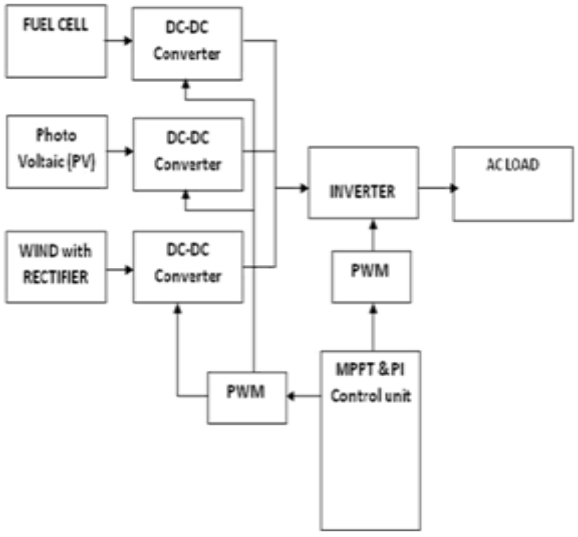
This system is combination of wind energy and alternative energy, accustomed generate power from one another. Hybrid system has advantage than system those that are entirely rely upon single supply of energy. Researchers have terribly robust task to maximize the total energy output from the system with lower value & dependableness[8]typically wind-solar hybrid facility consists of wind turbines, electrical phenomenon array, controller and storage battery. Wind turbines is employed to convert wind energy into energy so into electrical energy. no matter electrical energy is generating from this system is alternate & unstable. thus some dominant units or inverters ar used to build it continuous and store into battery. This energy utilize for domestic purpose or different. electrical phenomenon array having star panels through series or parallel, converts alternative energy into power. This energy is in DC kind, it's keep in battery and controller provide power for AC or DC masses. this technique having high daily electricity generation capability, low fabrication value, maintenance is low and has different blessings additionally needs OF WIND-SOLAR HYBRID facility

To develop this technique & to research performance, modeling and mathematical calculations got to develop. totally different models of hybrid system have lined in literature. Following are the parts from review of literatures:- meteorologic data: - meteorologic analysis of the location has to be created for improvement method. it's vital for total utilization of PV/Wind sources. measure star and wind resources information is main input of the hybrid system. that each one information ought to be measured hourly, daily and as per weather or temperature change. Load Demand: - it's necessary a part of system to style & analyze. to search out out the precise load demand it's terribly sophisticated and troublesome to come to a decision. Load variation for various seasons isn't certain, thus system got to style for nearer or over load demand to full fill needs. System Configuration:

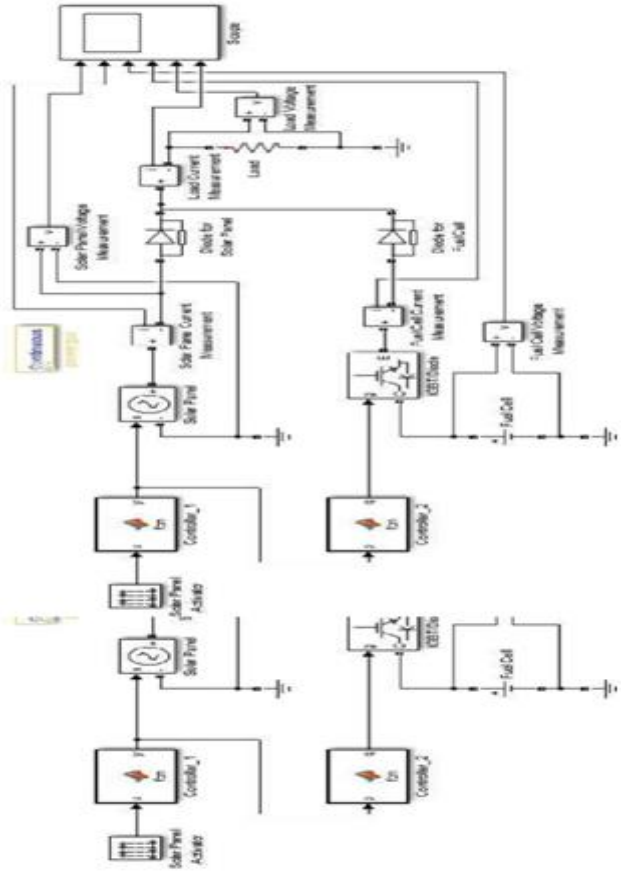
By finding out all information like radiation, wind speed and cargo demand correct choice of equipments got to be created. however filler of system are going to be in line with the environmental conditions. as a result of manufacturing power from solar-wind is depend on the placement that is to be selected . it is clear that there are two power sources, solar cell and fuel cell. A control device checks the logic to supply power to the load from one of the sources. The power is supplied from any one of the sources at a time.

III. SYSTEMDESING

This photovoltaic cell based mostly hybrid facility uses the photovoltaic cell because the main power supply to provide the load.



The electric cell employed in this technique acts as a backup facility. an impact device controls the flow of power to the load. once there's ample



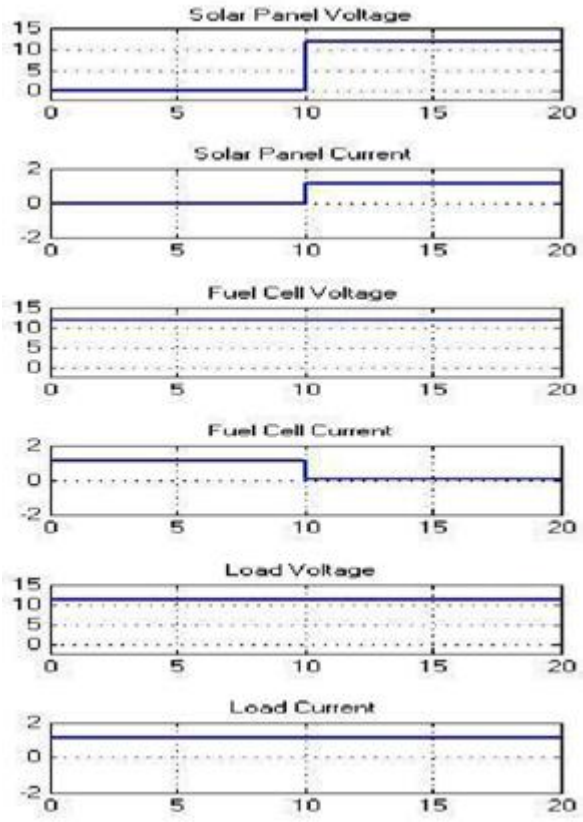
power within the photovoltaic cell [10], the management device offers power to the load from a photovoltaic cell. Otherwise, it provides power to the load from electric cell.

IV. SIMULATION AND RESULTS:

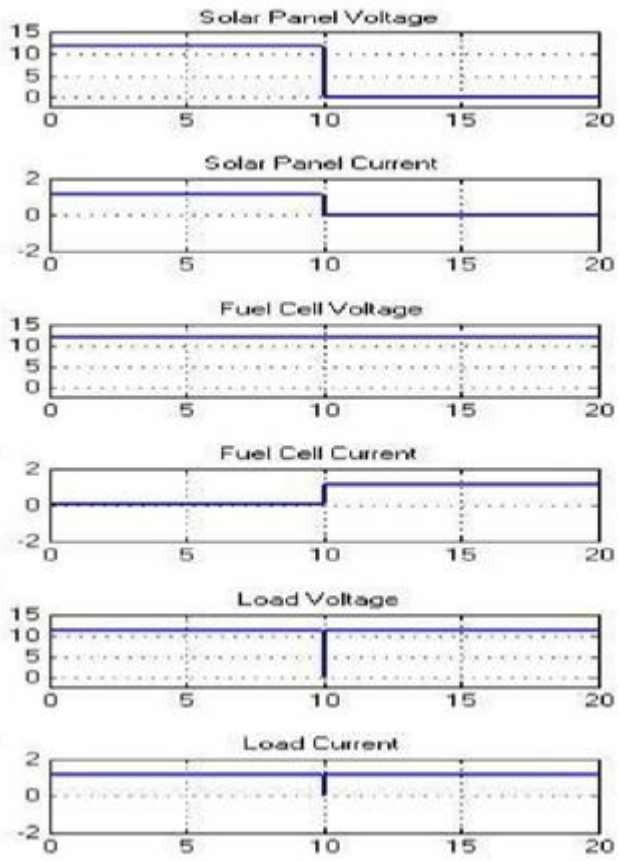
Simulink model of the system illustrated in an indication controlled voltage supply represents the cell, and a dc voltage supply represents the cell. different Simulink blocks employed in this simulation ar a generator to activate the cell, 2 programmed MATLAB operate blocks as management device, an indication controlled voltage supply as representing cell ,a dc voltage supply serving cell ,an IGBT as a switch to activate the cell once gets signal from management device, 2 diodes to forestall the rear voltage into one supply from another, 3 voltage activity blocks to live star voltage, cell voltage and cargo voltage, 3 current activity blocks to live cell current, cell current and cargo current, a scope to check the energy and current curves of cell, fuel cell, and load, a resistance is employed as a load. The performance of the Simulink model of the cell primarily based hybrid installation is investigated with resistive load application. Here the simulation was run just in case of twelve V dc voltage, and therefore the cases were analyzed.

Following results are obtained to validate Voltage and current characteristics of the C. Voltage and current characteristics of the model with regard to time once electric cell is turned on When the load is provided by the cell, and therefore the electric cell is of the curves look as like as in Fig half-dozen. within the case of this once the load is at the start pass by the cell, and therefore the electric cell is off, the solar battery voltage is zero, and therefore the solar battery current is additionally zero.

The cell voltage is 12V, and therefore the cell current is one.8A about. The load voltage is 12V, and therefore the load current is one.8A around. thus it's clear that the load is provided by the cell through the controller. once time is ten second, the solar battery is turned on suddenly. directly the solar battery voltage becomes one2V from zero and solar battery current becomes 1.8 A .



Especially when solar energy is used in combination with fuel cell power, the system works smoothly even though there is no power storage device to store solar energy. From the results, it is clear that it is possible to deploy a nonconventional renewable hybrid power system to supply any load without any interruption even if the sources are interchanged based on the sufficiency of the supply power. On the other hand, the fuel cell terminal voltage was 12 V, but the fuel cell current becomes zero from 1.8A approximately. There was no change in load voltage and load current. They were the same as before. That means the control device changes the supply source from the fuel cell to solar cell.



V. CONCLUSION

In this paper, a cell based mostly hybrid installation has been engineered and therefore the model has been verified by analyzing the voltage and current levels of the sources employed in this model. within the case of hybrid power, the references ought to be capable of delivering power to a load ceaselessly .The use of solar–wind hybrid renewable energy system is ever-increasing day by day and has shown unimaginable development in previous couple of decades for electricity production everywhere the globe. By exploitation this development of latest technologies and researches within the field of solar radiation hybrid renewable energy system, a replacement problem arises, that become rather more simply resolved with new techniques. during this model the continuity of provide to the load was maintained through one amongst the sources was ever-changing its state.

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