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Electrification of Room Through Solar Technology

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Abstract- *This paper describe the electrification of room through solar energy. This project focuses on utilization and implementation of solar technology. The Conversion of solar energy is done by solar panel followed by inverter. The selection of ratings for the devices is being done by the calculation of connected load .By installing solar panel we can utilize solar energy for generation of electricity. This will ultimately provide us nonpolluting, clean energy. It is one time investment which will reflect in reduction of electricity bill.*

Keywords*—Solar energy, Solar collector, Solar power generation, Inverter.*

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INTRODUCTION

The global need for energy is constantly increasing and makes it inevitable to reinforce the use of alternative resources. The sun is one of the richest energy sources in this context and is almost inexhaustible. Energy efficiency and solar technology are important element to any building or community design. Also, they are important to the nation and to the earth. The sun is massive reservoir of clean energy and the power from the sun's rays that reach the earth is called solar energy. Solar energy is the most readily available source of energy. Solar energy received in the form of radiation can be converted directly or indirectly into other forms such as heat and electricity which can be utilized by the man [1].

Since the sun is expected to radiate essentially at a constant rate for a billion years it may be regarded as an in-exhaustible source of useful energy. Solar energy has been used since prehistoric times, but in a most primitive manner. Before 1970, some research and development was carried out in few countries to exploit solar energy more efficiently, but most of this work remained mainly

Academic. After the dramatic rise in oil prices in the 1970s, several countries began to formulate extensive research and development programs to exploit the solar energy.

Solar energy is the most direct, common, and clean energy on our planet we have already found until now. Today solar energy absorbed by the earth is about 3,850,000 ex joules (EJ) in one year, which is even twice as much as all the non-renewable resources on the earth found and used by human being, including coal, oil, natural gas and uranium etc. The solar resources can be seemed inexhaustible

A photovoltaic solar panels absorb sunlight as a source of energy to generate electricity. A photovoltaic (PV) module is a packaged, connected assembly of typically photovoltaic solar cells [4]. Photovoltaic modules constitute the photovoltaic array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications.

In current scenario, the worldwide demand for energy is expected to keep increasing at 5% each year which forces a continuous rise in the prices of fossil fuels which indirectly reflects on the price of unit generation.

In this context, we need to think for implementing renewable energy source i.e. solar technology as a major of generating electricity. By installing solar panels we can utilize solar energy for generation of electricity. This will ultimately provide us non-polluting, clean and reliable energy. It is one time investment which will reflect i in reduction of electricity bill.

TOTAL ESTIMATION OF ROOM

CALCULATION OF LOAD:

Tube light	8no's	40W each	320W
Fans	4no's	80W each	320W
Total			640W

Costing

As per the connected load 6 solar panel of 250W each are suitable

i.e250W*6=1500W

Cost of 250W solar panel is 10,000Rs/-, therefore cost of 6 solar panel

i.e10,000*6=60,000Rs/

Inverter circuit of 1.5KW costing =30,000Rs

Fabrication and installation cost =40,000Rs

Total cost=60000+30000+40000

= 1,30000Rs/-

For implementation purpose:

CALCULATION OF LOAD :

Tube light	2 no's	80W each
Fans	1no's	50W each
Total		130W each

COSTING:

As per the connected load 3 panels of 75W is required.

Cost of 75W solar panel is 3,750/- ,therefore cost of 3 solar

panel i.e3,750*3=11,250Rs/-

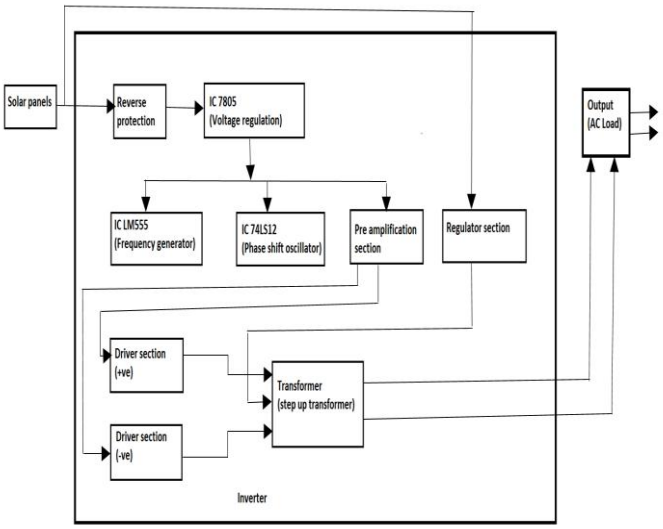
Inverter circuit of 200VA costing 7,000Rs/-

Fabrication and installation cost 6,000Rs/-

Total cost=24,250Rs/-

BLOCK DIAGRAM

Solar Circuit



COMPONENTS

Component	Rating
Solar Panel	75W
Inverter	200VA
Transformer	200VA
IC 7805	-
IC LM555	-
IC 74LS112	-
Resistors	-
Transistor	-
Diodes	-
Fuse	5A
Capacitor	300nF

When there is no AC supply outlet, we couldn't charge the inverter battery & get high voltage output. In this

article Photovoltaic solar based inverter circuit given with easily available components and it helps us to charge the inverter battery without external AC supply outlet. It can be encapsulated as handheld inverter.

Photovoltaic solar inverter circuit constructed with five different stages.

1) PV Solar panel
2) Regulator
3) Inverter Circuit
4) Switching Device
5) Step Up transformer

PV SOLAR PANEL: In this circuit 12 Volt / 20 Watts Solar panel used to get input bias .It gives peak 12 volt at 1600 mA when exposed to the open Sun.

REGULATOR: The LM555 adjustable three terminal Positive voltage Regulator used here and it can give output voltage range from 1.25 V to 37 V with more than 1.5A current rating. Final output from the regulator is given to 12/4.5Ah SLA Battery, this Battery provides DC bias to the inverter circuit. Regulator LM555 output voltage V out.

INVERTER CIRCUIT: The main scope of the project is, the photovoltaic cells are converting the sunlight into electricity a charge controller is used. PV cells are bundled together in modules or panels to produce higher voltages and increased power. As the sunlight varies in intensity the electricity, so generated.

SWITCHING DEVICE: Switching function in inverters is needed to alternate the direction of the DC current in order to produce AC power. Usually, electronic semiconductor devices are used to perform switching, such as transistors and thyristors. Thyristors are used in basic models of inverters.

STEP UP TRANSFORMER: Inverters are often needed at places where it is not possible to get AC supply from the Mains. An inverter circuit is used to convert the DC power to AC power. Inverters can be of two types True/pure sine wave inverters and quasi or modified inverters. These true /pure sine wave inverters are cost, while modified or quasi inverters are inexpensive.

These modified inverters produce a square wave and these are not used to power delicate electronic equipment's. Here, a simple voltage driven inverter circuit using power transistors as switching devices is build, which converts 12V DC signal to single phase 230V AC.

Working:

The solar panels convert the solar energy into electrical energy. This energy is then supplied to the inverter, which is used to convert the DC supply received from the solar panel into AC supply required by the load. The inverter consist of various section like reverse protection, IC7805 for voltage regulation, IC 74LS12 for phase shift oscillation, pre amplification section, driver section and transformer. The transformer step up the voltage level, it provides 230v at the output which is required by the AC load.

CONCLUSION AND FUTURE SCOPE

Solar panel and inverter circuit is used to transform solar energy into electrical energy .This would be a onetime investment which will reflect in reduction of electricity bill. As per the observation of a room consist of 2 tube light and 1 fan i.e. total load of 130 w. The working hours of the devices is 6 hrs. Overall the devices consumes 1 unit per day (approx). So, monthly the devices consumes 30 units per month. The cost of per unit is Rs.15/-(approx), therefore the monthly electricity bill would be Rs.450/- whereas yearly electricity bill would be Rs5,400/-. By implementing solar panels, the electricity and according the charges would be saved. The implementation of solar technology is costly but in 2 years the initial cost of devices involved in solar technology would be recovered. The life of solar panels is 15 years therefore it would provide clean, nonpolluting, renewable energy without any costing.

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