# REVIEW ON PORTABLE MICRO SOLAR POWER PLANT

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## Abstract

*This review paper is about portable micro solar power plant. The portable solar micro power plant has a capacity of generating electricity unto 200 watts. This amount of electric power can supply up to 96 hours of electricity for operation of small electrical appliances. The cost required for developing the solar power plant is low. It has also a low maintenance cost as only batteries need to be changed once in every 3-4 year. This power plant is also suitable for local shops and vendors. It has a potential to replace conventional generators.*

*Keywords:-Photovoltaic, Solar charge controller, inverter, batteries, portable sheet metal box*

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## I. Introduction-

The apparent Limitation of fossil fuel meant solar energy becoming widely used renewable source of energy in the upcoming future. The solar power plant has a capacity of generating electricity unto 200 watt. This helps in providing power to non-portable device such as fan, projector, computer etc. This solar power plant components are 2 solar panels of 100 watt each a 250 watt inverter 4 batteries of 12 v 8 amp, Charge controller 250 watt. Inverter, charge controller and battery are mounted inside a portable sheet metal box with wheels attached below it. The solar panels are mounted on top of the power plant. This construction makes it easily portable. Solar energy is available in abundance and it does not cause harm to the environment with no greenhouse gas emissions. This solar power source makes it possible to provide a clean reliable supply of alternative electricity free of sags or surges which could be found in the line voltage frequency.

## II. Literature review-

The literature we have studied we observed that many researchers have worked on the design and development of portable plant. The use of solar energy is not new as it dates long back 7 century bc. But last couple of years the focus on energy consumption worldwide rapidly spurred growth in the research and development of a green alternative fuels like solar energy. Some paper that we studied in design and development of portable solar power plant are Abdul majid ZA 2011 it is based on utilization of energy obtained from solar Panel as it is the most important topic of research of sustainable source of energy. It states the output of solar Panel is very low hence optimization is required and which is achieved by adjusting of solar panel at an orientation which will capitulate maximum power output. Sopin K paper it is based on maximum power point tracker of partially shaded solar photovoltaic arrays using modified adaptive perceptive particle swarm optimization. Ruslan M F, Othman M Y, and Sopian K Solar panel with inverter would be recommended since it was a noiseless, it does not use fuel and it is environmental friendly. The solar power systems was a convenient way of producing an alternative means of power supply the conventional electricity generator.

## III. Advantage-

1) The Solar power plant requires very low maintenance cost and have a long life span.

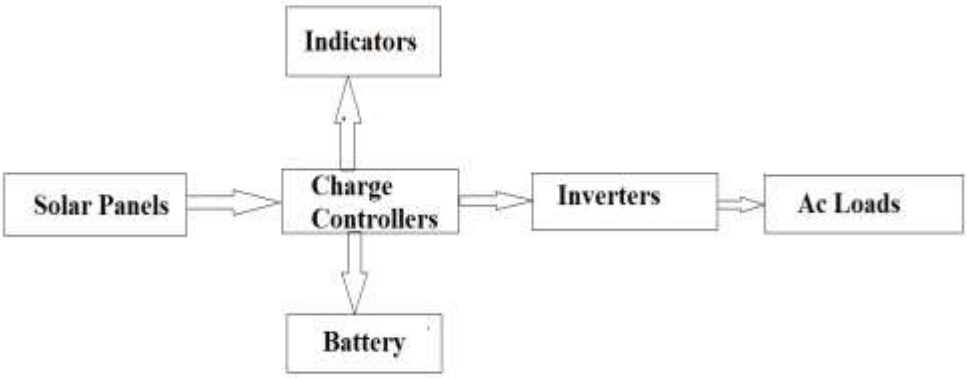
2) It works in remote are where the availability of electricity not present.

3) It also stores energy which can be used at night as the battery is charged.

4) The portable solar power plant can be transported easily.

5) The electric generating cost is low than conventional electricity generation

**Block Diagram** -




(Block diagram for portable solar power plant)

## IV. Application –

1) This portable solar power plant can be used for residential Purpose as it helpsin running of various domestic appliance like lights, fans, computer, TV etc.

2) Street vendors can also Use this solar power plant as it is portable.

3) Farmers can also use it during their work in farm at night time. Conclusion- The portable solar power plant requires low maintenance cost, it stores energy with the help of battery and can be used at night time. It is small, lighter and Portable making it easy to store and suitable for use at home or night market and as backup Energy supply. Photovoltaic power production is gaining more significance as Renewable energy source due to its many advantages.

## V. Design specifications-

5.1) Inverter Sizing: Inverter rating=peak power * safety factor =4113*1.25 =5141.25~5150W Thus, the inverter rating 24V 5150W can be used for this system. Supposing the inverter efficiency is 0.9. The DC equivalent energy demand of AC load is given as: Eac load =Total AC load Wh per day/inverter efficiency =14632Wh/0.9 =16257.7778Wh electricity conversion.

5.2)Battery Bank Sizing: The energy need to store by battery bank is given as: Energy store=Energy load*D/MDoD Energy store=16260wh*4/0.5 Energy store=130080Wh The number of autonomy days is taken as 4 and the maximum allowable depth of discharges taken as 50%, due to remote standalone PV system.

5.3) charge controller sizing the solar charge controller is typically rated against Amperage and Voltage capacities. Select the solar charge controller to match the voltage of PV array and batteries and then identify which type of solar charge controller is right for your application. For the series charge controller, the sizing of controller depends on the total PV input current which is delivered to the controller and also depends on PV panel configuration (series or parallel configuration). According to standard practice, the sizing of solar charge controller is to take the short circuit current (Isc) of the PV array, and multiply it by 1.3 Solar charge controller rating = Total short-circuit current of PV array x 1.3.

## VI. Conclusion-

The portable solar plant has the potential to replace petrol plant in future especially for lighting and running small electrical appliances. The power plant requires low maintenance cost as the battery needs to be changed

once every three to four years. It is light weight and portable making it suitable for use at home or at street vendors at night and as backup energy supply. Photovoltaic power production has more significance as it is renewable energy source and also eco-friendly.

**References-**

[1] Abdul Majid Z A 2011 Sistem pengering pam haba terbantu suria dengan pengumpul suria multifungsi. PhD Thesis, Universiti Kebangsaan Malaysia.

[2] Sopian K 2006 Bringing Renewables into the Mainstream Proc. of the Malaysia Chemical Congress (MCC) Int. Conf. on Green Chemistry (Kuala Lumpur, 19-21 September 2006) pp 234-241.

[3] Yatim B 1995 Inovasi Menghadapi Cabaran Bekalan Tenaga (Bangi: Penerbit UniversitiKebangsaan Malaysia) pp 31-32

[4] Sopian K 2008 Tenaga Keterbaharuan – Laluan Masa Depan Bebas Karbon (Bangi: Penerbit Universiti Kebangsaan Malaysia) pp 14-15

[5] Suruhanjaya Tenaga 2008 Industri Pembekalan Elektrik di Malaysia – Maklumat Prestasi & Statistik 2008. Kuala Lumpur Suruhanjaya Tenaga p 151

[6] Henden L, Rekstad J and Meir M 2002 Thermal performance of combined solar systems with different collector efficiencies Solar Energy 72(4) pp 299–305.

[7] Abdul Majid Z A, Ruslan M F, Othman M Y, and Sopian K 2008 Development of Floating Photovoltaic (FPV) Power Plant In Semenyih Dam Malaysia Proc. 9th SENVER + 2nd ISESEE,(Shah Alam1–3 Disember 2008) pp 513-517.

[8] Ruslan M F, Othman M Y, Sopian K, Abdul Majid Z A and Ai Him W 2008 Development of Photovoltaic-Thermal (PV/T) Water Based System (Proc. of the World Renewable Energy Congress (WREC X), Glasgow 19-25 Julai 2008) pp 1853-1857.

[9] Kalogirou S A 2004 Solar thermal collectors and applications Progress in Energy and Combustion Science 30 pp 231-295.

[10] Suruhanjaya Tenaga 2008 Industri Pembekalan Elektrik di Malaysia – Maklumat Prestasi & tatistik 2008. Kuala Lumpur Suruhanjaya Tenaga pp 12-14.