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MOUNTING A SOLAR PANEL ON A 3-WHEELER ELECTRIC CAR (EASY BIKE) AND ANALYSIS

Mohammad Imran, Md. Saheduzzaman, Md. Zakaria Mahbub
Saiham Siraj and A. R. M. Harunur Rashid

Department of Mechanical and Chemical Engineering (MCE), Islamic University of Technology, (IUT)
Gazipur, Bangladesh.

ABSTRACT

Easy Bike, a widely accepted 3-Wheeler electric car in our country.It lacks efficiency and speed.It cconsumes a huge amount of electricity so this project is done in order to reduce the consumption of electricity and increase the efficiency.A GY-100W solar panel is mounted on the roof and its electricity supply is experienced and day to day value is calculated and analyzed.the relative graph calculation and analysis is presented and experimental Data is shown.Iys efficiency is also calculated.It reduces the electricity consumption upto 22% and increases the efficiency upto 15%.

Keywords: Solar Energy, Automobile, Easy Bike.

1. INTRODUCTION

This is a battery charged Vehicle which earned a lot of popularity in the rural areas of Bangladesh.But this consumes a huge amount of electricity which has a negative effect. so the research is based on reducing the consumption of electricity. A 100 watt solar panel is mounted .Thus electric power is saved about 22%.

Fig 1. Experimental setup of solar panel on Easy Bike.

2. TECHNICAL PARAMETER

Battery: 5 Batteries(12 Volt X 5= 60 Volt)
Motor:1000W
Electricity Consumption: 3-4 Units, 220 Volt
Break System: 3-4 Mechanical
Mileage: (140-160)Km
Soalr Panel: 100Watt

3. ELIGIBILITY OF USING SOLAR PANEL

Using of solar panel in country like Bangladesh has introduced a new horizon in power saving.More than half of the year hot sunny days exist. It shows average temperature of 26.1°C(79°F).A calculation has been done to determine the amount of saving electricity which is about 5 ampere out of 18to20ampere current required to run the motor. So using of solar panel is highly eligible & recommended.Also it is enviornment friendly and economic.

4. IMPACT ON PERFORMANCE OF VEHICLE AFTER INSTALLTION

Average weight of 100watt solar panel is 11.5kg.This extra weight is compensated by reducing seat thickness and using ABS plastic bars instead of steel bars. The panel is mountained above the hood. Installation of solar panel doesn't create any problem.

Fig 2. Home equipment of solar panel.

Model: GY-100W

Maximum System Voltage	600V
Wind Resistance	5400pa
Series Fuse	8A
Application Class	Class A
Weight	11.5kg
Dimension	1100mmX808mmX35mm

All electrical data are given relative to Standard Test Conditions (1000W/m^2 @25°C AM1.5

	Vm	6.8	V
Rating Power Current Current	Im	1.47	A
Open Circuit Voltage	Voc	84	V
Short Circuit Current	Isc	1.6	A
Nominal Operating Cell Temp	NOCT	45°C	

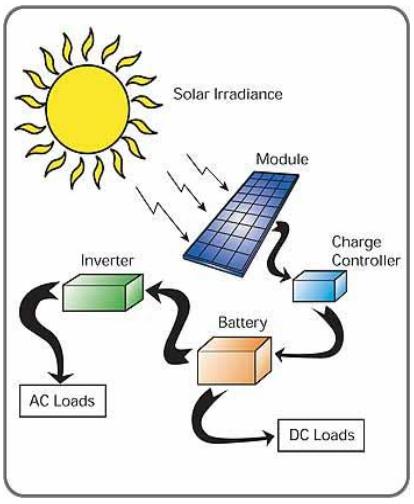

Fig 3. Utilization of Solar energy

4. MECHANISM

5 batteries(5*12=60 volt) are connected in series. By the help of these batteries electric power is sent to the controller. Also with the help of the inverter solar power is transmitted to the controller .Then the motor runs with the help of contactor. White and black colour controller units are set in the circuit portion. Black one is set in more interior and controls everything. Also Converter/Rectifier helps for lightening.There is a fuse which passes signal and coneects the easy bike with power. Thus it helps for "ON" condition.

5. GRAPHS

Temperature and Current Vs Time graph and Power Supplied Vs Particular days graph are gien below:

5.1 Temperature and Current Vs Time graph

Readings are taken 4 days in every month of February, March, April, May, june and July. Daily readings were taken from 8am to 5 pm. Temperature and the current output from the solar panel at different day time is shown in the graph.The electricity output varies with the change of temperature at different times. It is shown that the average current is about 4A from the solar panel.

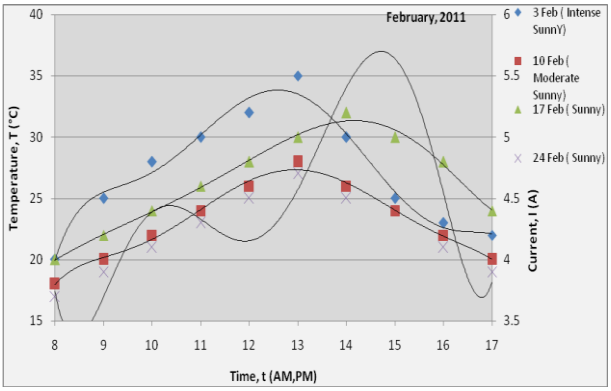

Fig 4. Temp(°C) & Current(Amp) vs Time Curve for February 2011.

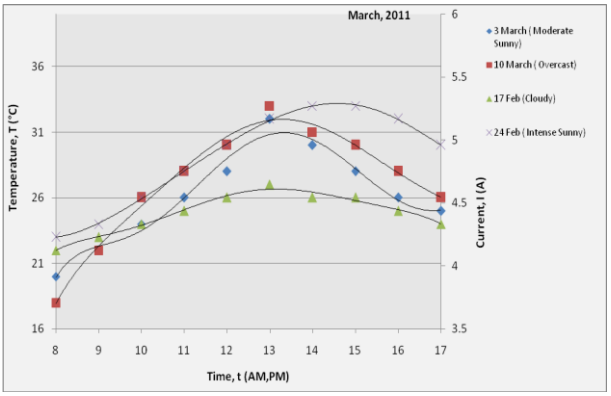

Fig 5. Temp(°C) & Current(Amp) vs Time Curve for March 2011.

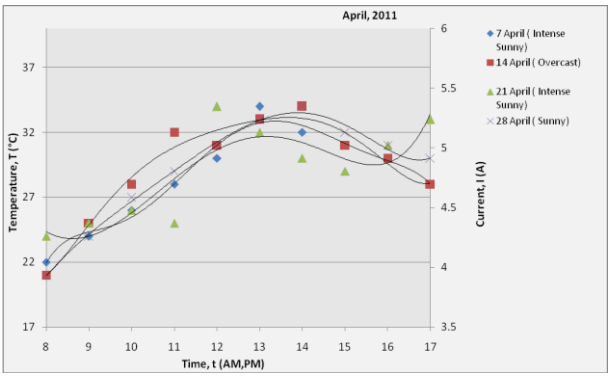

Fig 6. Temp(°C) & Current(Amp) vs Time Curve for April 2011.

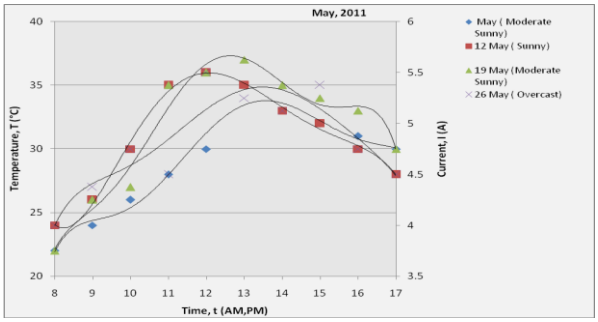

Fig 7. Temp(°C) & Current(Amp) vs Time Curve for May 2011.

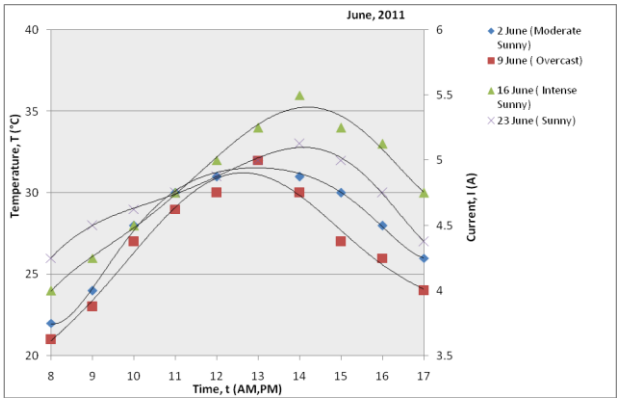

Fig 8. Temp(°C) & Current(Amp) vs Time Curve for June 2011.

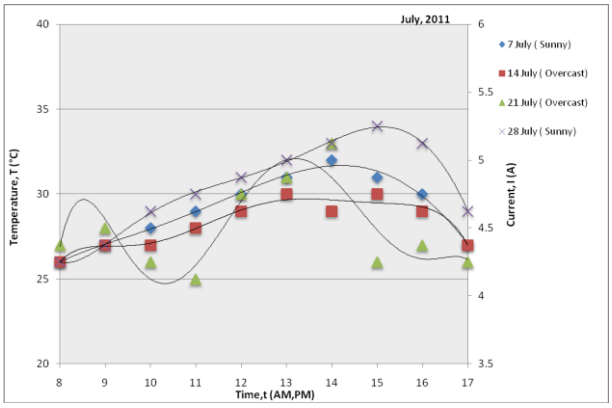

Fig 9. Temp(°C) & Current(Amp) vs Time Curve for July 2011.

5.2 Power Supplied Vs Particular days graph

Here readings are taken in 6 months in the particular days. The graph is between particular days Vs power supplied. Here it shows the variation between the solar panel and without the solar panel. The calculation is done in particular days in particular week. Here a lot of power is needed nearly 1000W power when there is no solar panel. But if when the solar panel is used, a lot of power is saved and it is near about 700W is required to supply to the easy bike. In this case a lot of power is saved with the help of solar panel. Both of the variation is shown in the figure.

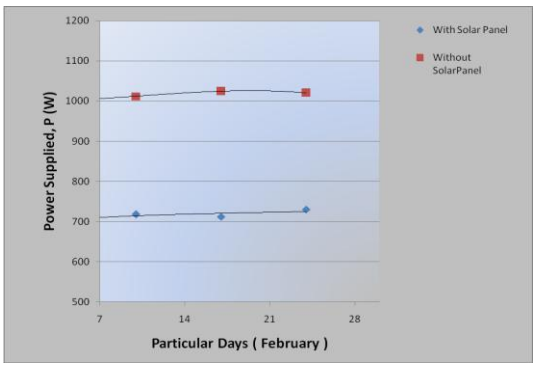

Fig 10. Power supplied (W) vs Particular Days Curve for February 2011.

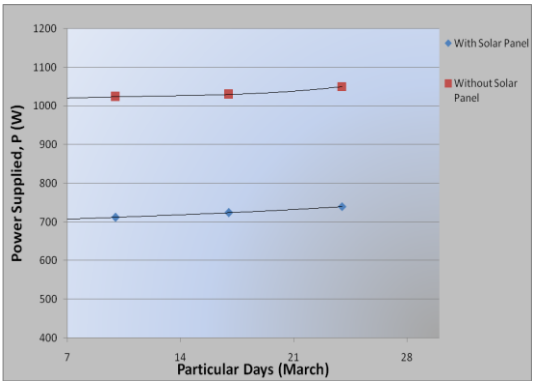

Fig 11. Power supplied (W) vs Particular Days Curve for March 2011.

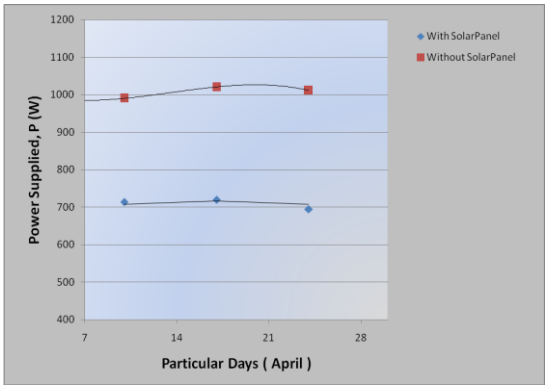

Fig 12. Power supplied (W) vs Particular Days Curve for April 2011.

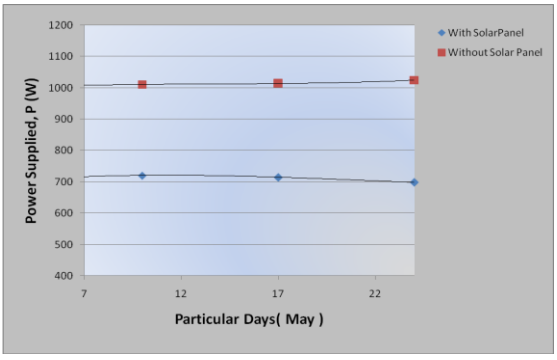

Fig 13. Power supplied (W) vs Particular Days Curve for May 2011.

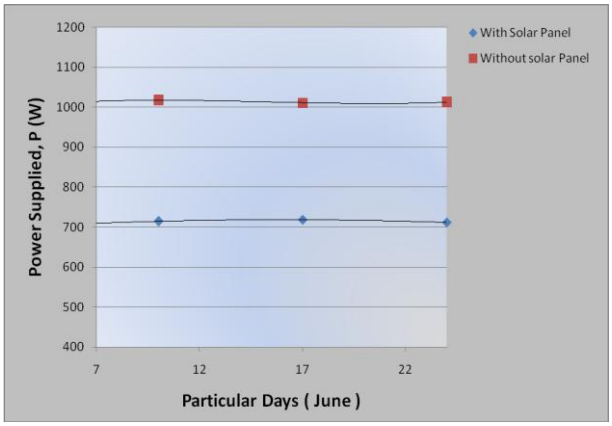

Fig 14. Power supplied (W) vs Particular Days Curve for June 2011.

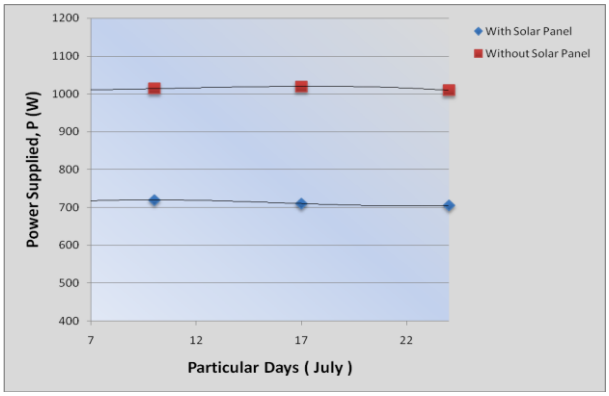

Fig 15. Power supplied (W) vs Particular Days Curve for July 2011.

6. CALCULATION

Panel Sizing:
Panel Specification:
Power: 100W
V(Open Circuit) : 32.5 V
V (MPPT): 27.14 V
CALCULATION:

1. 15KWH x 6 hr = 90KWh
2. 90 KWH / 4.5hr = 20 KW
3. 20 KW / 200 W = 100 Panel
4. no of panel in series in 1 set: 360 v / 27.12 v = 11.79 = 12 panel in series
5. 200 w x 12 pcs = 2.4 KW
6. no of set in parallel = 20 KW / 2.4KW = 8.33= 8 panel in parallel

Battery Calculation:
Battery voltage: 12 Vdc
Battery capacity: 100 Ah
1. Battery sizing: 288 Vdc / 12 Vdc = 24 pcs in 1 set [Here inverter input voltage is 288v]
2. 1 set = 24 pcs x 12V x 100 Ah = 28.8 KWh
3. 90 KWh / .8 = 112.5 KWh
4. 112.5 KWh / 28.8 KWh = 3.90 = 5 set
Total Battery: 5 x 24 pcs = 96 pcs
So 24 Pcs Battery are in series and 5 set are in parallel

Inverter:
Input Voltage: 200-400v
MPPT voltage: 320 Vdc
Output Voltage: 220V AC

Energy Saved:
Current required to run the motor of easy bike = 18A.
Current obtained from the solar panel = 4A (avg).
So energy or current saved = (4/18) x 100 = 22.22%

7. CONCLUSION

From different calculations and graphical representation we came to know about the eligibility of using solar panel. A profound experiment and analysis show us the new power saving idea by installing a solar panel on the three wheeler electric car. All calculations and experiments support each other smoothly. So the use of solar power should be implemented in every aspect of our life.

8. REFERENCE

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9.MAILING ADDRESS

Mohammad Imran
Department of Mechanical and Chemical Engineering
(MCE), Islamic University of Technology,(IUT)
Gazipur, Bangladesh.
E-mail: imraniut07@gmail.com