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Manufacture of Solar Panel with 300W Inverter for Household Electricity Needs

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Abstract– Solar panels are semiconductor elements that can convert solar energy into electrical energy. ThisResearch on Solar Power Plants (PLTS) assemble with materials such as solar panels, 3000 W inverters, batteries, relays and control chargers, after that the load calculations are carried out, then implementation and testing is carried out. This research also aims as a renewable electric power in the future. From the results of the PLTS load test carried out at the researcher's house, the highest load was 405.32 watts, while the highest load test results used PLN electricity, which was 267.06 watts. So it can be said that this research is successful in meeting the electricity needs of household scale.

Keywords: solar panels, PLTS

- INTRODUCTION

Indonesia as a tropical country has advantages in sunlight. One of the uses of sunlight is using solar panels. The solar panel is a semiconductor element that can convert solar energy into electrical energy with the photovoltaic principle. The voltage and electric current produced by solar cells are influenced by the intensity of solar radiation and the ambient air temperature. The lower the intensity of solar radiation, the lower the current and voltage generated. The temperature of the environment around the solar panels also contributes tochanges in the temperature of the solar cells. (Deny.S and M. Marhaendra Ali, 2016).

At this time electrical energy is very important for human life. Almost all human activities require electricity. Starting from the use of cellphones, laptops,to lamps for lighting at home, but the electricity we use today is mostly produced by steam power plants (PLTU) as much as 40% of the total electricity generated by power plants in Indonesia. To generate electricity, a steam power plant (PLTU) requires coal as fuel to heat water and produce steam. Data from the Directorate General of New, Renewable Energy and Energy Conservation (EBTKE) shows that Indonesia has a potential for new and renewable energy of 441.7

GW, while until now the potential for new and renewable energy that has been realized by the state is 8.89 GW. This shows that Indonesia still has a large amount of homework from the new and renewable energy sector .

One of the new renewable energies is photovoltaic or better known as solar power generation. A solar power plant is a power plant that converts sunlight into electrical energy. In addition, solar power plants do not damage the environment which can harm humans because to produce electricity, solar power plants only need sunlight to produce electricity. Indonesia itself greatly benefits from its geographical location, which is located below the equator. This makes Indonesia a tropical climate which makes the sun shine all year round. According to the Directorate General of New, Renewable Energy and Energy Conservation, the electrical potential that can be obtained from solar power plants in Indonesia is 150 GW, but only 0.95 GW has been realized. There are several factors why PLTS has not been widely used to generate electrical energy. First, to make a solar power plant, a large area is needed to place solar panels. Second, the lack of public knowledge about PLTS. Third, people think that PLTS investment is too expensive. Fourth, people's ignorance about how to calculate the capacity of PLTS that must be used. (Prasetyo Osep, Porman. P and Asep. S, 2019).

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- METHOD

A. Product Design

The first step in research is assembling materials, including solar panels, 3000 w inverter, batteries, relays and control chargers, after that load calculations are carried out, then implementation and testing is carried out. To get the voltage and current generated on the solar panel with a 3000 W inverter, using ampere pliers and a digital multitester. Measurements were made every hour to determine the change in current and voltage every hour.

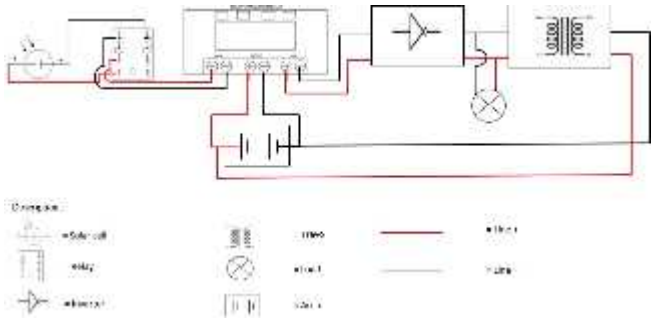

Figure 1: PLTS Circuit

- RESULTS AND DISCUSSION

The assembly results in this study are shown in thefigure 2.

Figure 2. PV Grid Assemble

A. PLTS Test Results

A tool to measure current and voltage using a multi tester, a multitester is a tool that can measure. The following is the data on the results of the solar power plant (PLTS) load test which was carried out for 7 days with a duration of 8 hours from 06:00 WIB to 13:00 WIB which was tested at the tester's house.

Flow of electric current and voltage. Calculation of the load or electrical power using the formula P=V x I . Here's a list of load used for testing the PLTS for home electricity consumption researcher:

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Table 1. PLTS Test Load

No.	Name of goods	The amount ofgoods	Burden	Total Load
1.	Light	16 pcs	5 Watts	80 Watts
2.	Fan	5 pcs	50 Watts	250 Watts
3.	Refrigerator	1pcs	70 Watts	70 Watts
4.	Water pump	1 Pcs	125 Watts	125 Watts
5.	TV	1 Pcs	55 Watts	55 Watts
	Total			580 Watts

The loads used daily for PLTS testing are lights, fans, refrigerators, water pumps and TVs, where the total load is 580 watts.
Where :
P : Electrical power (*Watts*)
V : Voltage (*Volts*)
I : Electric Current (*Ampere*)

The following table shows the average results of thePLTS and PLN load tests:

Table 2. Average Results of Daily Load Test (PLTS)

No	Day	Average UsageLoad
1.	First	405.32
2.	Second	267.96
3.	Third	311.60
4.	Fourth	323.36
5.	Fifth	265.10
6.	Sixth	291.09
7	Seventh	312.30

Table 3. Results of Average Daily Load Test (PLN)

No	Day	Average Usage Load
1.	First	229.38
2.	Second	242.28
3.	Third	183.33
4.	Fourth	267.06
5.	Fifth	205.24
6.	Sixth	242.28
7.	seventh	229.38

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Figure 3. Graph of Average Daily Load Test Results (PLTS)

Figure 4. Graph of Average Daily Load Test Results (PLN)

From the results of the calculation of the average load testing carried out for 7 days with PLTS, the highest load testing measurement can be obtained on the first day with a load result of 405.32 watts. While the results of the calculation of the average load testing with PLN get the highest results, namely 229.38 watts. With the results of the highest load test, it can be said that the development of a solar power plant (PLTS) using a 3000 watt inverter can be said to be very safe, because PLTS can meet electricity consumption for household needs with a predetermined time duration from 06:00 WIB until 13:00 WIB.

- CONCLUSIONS

From the PLTS test, the result is that the largest average current per day is 1.73 amperes . The largest daily average voltage is 235.95 volts . The biggest load or average power per day is 405.32 watts . While the highest average daily load using PLN is 267.06 watts , then the development of PLTS using a 3000 watt inverter can be said to be safe because it can meet household electricity needs with a duration from 06:00 WIB - 13:00 WIB for 7 days in Indonesia. researcher's house.

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