



ELECTRIC GENERATOR WITH SOLAR POWER ON FISHING BOAT

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ABSTRACT

When fishermen go out to sea to catch fish, they are generally heavily burdened with fuel for the electric generator engine for lighting, boat propulsion engines and cooking utensils on fishing boats. In the ocean around the boat, there is abundant potential for solar energy, but it has not been used as a source of electrical energy for lighting and driving fishing boats to increase the productivity and economy of fishermen. If the energy is used properly, fishermen will get cheap, sustainable electrical energy and improve the welfare of fishermen. The purpose of the study was to test the performance of solar power generators on fishing boats as a cheap and sustainable energy source. The method used is assembling and installing components, testing the solar electric generator placed on the roof of the boat, then electricity which is partly used directly and partly stored in the accumulator to stabilize and supply energy to other electrical loads. The result of this research is to produce a model of a solar electric generator on a boat.

Keywords: Electric, Generator, Solar, Fishing, Boat.

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1. INTRODUCTION

In general, all countries located in the equatorial region have the potential for solar energy, more specifically in the sea as the work area of fishermen which is very abundant in solar energy and fish [1]. Most fishermen still live in the poverty line [2], due to the low income of fishermen caused by the increasingly expensive cost of fuel and its scarcity in the middle of the sea and on the outer islands [3]. Until recently fishermen used a lot of fuel for outboard engines and generator sets on boats. When fishermen go out to sea to catch fish, they use boats with outboard engines that use fuel as their energy source. At night, fishing also brings floodlights from the electric generator engine at night which causes vibrations, costs fuel and produces air pollution [4]. As a solution to the problem above, a solar generator was tested for traditional fishing boats

to reduce the burden of fuel costs. The innovation of testing the solar energy generator is a device that converts solar light energy into electrical energy by using the photoelectric effect [5]. The solar energy system is directed at fishermen in the sea and outer islands as remote areas that are impossible to reach by the state power generation network. Solar energy is energy that can be converted into electrical energy to be used by humans in meeting the energy needs that are indispensable in today's times [6,9]. On the outermost island is a group of small islands generally using Diesel engine power plants as a source of electrical energy.

2. LITERATURE REVIEW

The rate of solar energy delivered by electromagnetic waves per unit time by the Sun as a special star that has a very far radius from the earth [1,2]. Solar radiation is a process of energy propagation in the form of electromagnetic waves without the need for intermediate substances [3-5]. Solar energy can reach the Earth's surface by means of radiation [6]. Between the Earth and the Sun there is a vacuum (no intermediate substance), but there is electromagnetic wave radiation that propagates it [8,9]. The form of radiation in the field is in the form of components of an electric field and a magnetic field, so that it can propagate at very high speeds and without the need for an intermediate substance or medium [10]. There are two ways of solar radiation to the earth's surface [11], namely: a) Direct Radiation, b). Diffuse Radiation, c). Global Radiation. Solar Power Plants are converting sunlight into electrical energy, in unlimited quantities so that they can be designed to supply small to large electricity needs, either independently or with a hybrid [12]. The operating factor of the Solar Cell to get the maximum value depends on: a). Solar solar radiation, b) Wind speed blowing, c) Earth's atmosphere, d) Optimum orientation of the panels towards the sun, d) Position of the solar cells to the sun. Broadly speaking, the solar electrical system [13], consists of: a) an integrated system where no batteries are needed, b) an independence system which is a system that has been widely used and is connected to a direct current load and connected to an alternating current load [14].

3. EXPERIMENTAL SETUP

The process of installing a solar electric generator is installed directly on a fishing boat as shown in Figure 1 as a tool to convert solar energy and generate electrical energy through solar modules in the form of photovoltaic cells. The main components of this generator are solar modules, charger controller, inverter and accumulator of electrical energy. Solar module is a series of solar cells that are connected in parallel then laminated and framed. The charger controller functions as a regulator of electric current, namely controlling the current between the accumulator of the solar module arrangement and the load and to ensure that the electrical parameters in the accumulator [12]. Accumulator is a device that converts chemical energy into electrical energy, and stores electrical energy in the form of chemical energy [13].



Figure 1 Installing a Solar Electric Generator on a Fishing Boat

3. RESULTS AND DISCUSSIONS







Solar energy is abundantly available around fishing boats with a very large intensity of solar radiation throughout the year [1,3]. The solar panel module is a solar cell in the form of a semiconductor diode [4,6]. The solar panel consists of a layer of top glass, anti-reflective coating, cell of Poly Vinyl, Ethylene Vinyl acetate and back contact from Aluminum and Tedlar-Poly Vinyl Fluoride. As long as there is radiation from the sun, solar panels can produce direct current electricity. Environmental temperature greatly affects the surface temperature of the panel affects the performance of Poly Vinyl [8].



Figure 2 Photo of the Results of Testing the Solar Energy Generator on the Boat

In accordance with Figure 2 which describes the results of the research on testing the solar power generator. In a solar power generator, solar cells are used to convert energy from the sun into electrical energy [3,5]. Then the electrical energy generated can be used directly, it can also be stored in the accumulator unit by using a charger controller to transfer electrical energy to the accumulator so that it can be used for the electrical load on the boat in the form of lighting [6,8]. With specifications as described in table 1 as follows:

Table 1 Specifications of The Solar Power Generator on the Fishing Boat

No	Main Component	Capacity Component	Unit
Solar Cell			
1		Maximum Power	44,28
		Voltage	
		Maximum	5,60
		Out put Power	2 pcs x 185 = 370
		Thickness	3
		Wide	81
	Long	158	cm
Accumulator			
2		Power Voltage	V : 12
		Power Current	I : 100
3		Charger Control	V : 12 Volt I : 100 A
4		Inverter	500 Watt
5		Surya Lamp 30 Watt Led Flood Light	6
6		Thermometer-Hygrometer-Timer	1

Based on Table 1, the results of the research on testing the solar power generator on fishing boats using Poly-crystalline panels [10] are able to produce an average electric voltage in sunny weather at 13.30 during the day, the obtained $V = 14.35$ Volts and strong current $I = 15.34$ Ampere, then the electric power in sunny weather is generated by the Solar generator on the boat, namely $P = V \cdot I = 14.35$ Volts \times 15.34 Ampere = 219.98 Watt. The electrical power generated is partially accommodated in charging to the accumulator so that electrical energy can be used at night in a stable and good manner with the settings on the charger controller. The test of the solar energy generator is tested starting in the morning at 07.00-17.00, and then it can reach a maximum level at 13.30 in the afternoon starting to fall until late at night [11]. Solar power generators on fishing boats are very helpful for fishermen in terms of the cost of lighting while sailing. Then its utilization can be developed as a source of energy for boat propulsion and fish cooling to extend or increase fish storage time in fishing boats. The solar power generator is placed on the boat very effectively absorbs solar energy when the weather is sunny and direct contact with solar light causes the absorption of most of the solar energy [2,4].

Based on Figure 2 above, the working principle of solar energy power generation technology on fishing boats is one of these technologies, young, inexpensive, environmentally friendly and the operation is very simple, practical, for that reason it is very good for use on fishing boats that have sunlight all day long. the sun without being blocked in the form of tall trees, buildings or mountains [6,7]. Its advantages are that it does not use fuel oil, it is reliable and durable, resistant to rain and wind with very low operating costs. This solar energy technology can increase fishermen's profits 3 times compared to traditional methods and the use of electric generator engines or petromax lamps [810]. The benefits of solar power generators for fishermen are changing the mindset of fishermen, increasing their productivity to utilize solar energy and making fishermen's operational costs more economical and profitable [12]. Indicator The performance parameter of the solar panel unit is strongly influenced by the intensity of solar radiation and temperature. [13]. Temperature conditions and the strength of sunlight radiation greatly affect the characteristics of the current, voltage or decrease in the output power that can be produced [14].

5. CONCLUSIONS

The test results of solar power generators with a capacity of $219,98$ Watt are installed in parallel and produce maximum electrical power in sunny weather with optimal temperatures. The generator electrical energy generated can be supplied to the accumulator and can also be used directly on the load with direct current electric current. Fishermen take advantage of cheap, environmentally friendly and sustainable electrical energy as well as free fuel costs in boats and improve the welfare of fishermen and the national economy.

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