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APPLICATION OF UTILIZATION OF RENEWABLE ENERGY SOURCES WITH METHODS SOLAR CELL IN SUKADAYA CIKULUR LEBAK BANTEN VILLAGE

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ABSTRACT

In the era of industrial technology 4.0 we are required to know and use emerging technologies. One of the technologies that need to be known is regarding solar cells as a renewable energy source. The implementation of solar cell utilization also needs to be done as concrete evidence of reducing electricity consumption derived from fossil energy sources that cause much pollution. The purpose of this community service is to improve insights and facilities through the utilization of renewable energy. Increased insight is done by socializing partners about the workings and advantages of solar cells. While the improvement of facilities is done by presenting portable solar cells and solar-powered lights. Based on the survey conducted, the implementation of this activity received an excellent response and partners expect other programs.

Keywords: *Solar Cell;Pandemic Period;Renewable Energy Sources;*

INTRODUCTION

Sukadaya Village as one of the villages located in cikulur sub-district, is a village whose people livelihood as farmers, ranchers, planters, artisans, with traditional farming systems,economic level limitations and problems of rural electricity needs in the pandemic period encourage the growth of renewable electricity utilization to increase. In addition to overcoming economic and commercial barriers, the utilization of renewable energy sources by the goals or goals set by some countries that want to maximize the potential of renewable energy in their region at low cost.Electricity is one of the primary energy cannot be released Application in the daily needs of life, Sukadaya Village is a tropical climate Utilization of solar energy as a pollution-free and abundant, renewable, renewable resource, which can be used either directly or indirectly. Solar energy can be used as a direct heater, heating water and air with solar collectors in the household sector, government agencies at the village level and household-scale industries. The increasing number of villagers and the increasing use of equipment that uses electricity resulted in the need for electricity increased rapidly. The increase in electricity consumption every year is expected to continue to grow. General Plan of Electricity Supply (RUPTL) of PT PLN (Persero) in 2010-2019. Although it is the primary need, the provision of electricity is still not evenly distributed in Indonesia until now. There are still many villages that have not been reached by electricity.

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METHOD

Data collection research was conducted on August 27, 2021 in Sukadaya Village, Cikulur District, Lebak Regency, Banten Province. The use of data in this study is qualitative and quantitative data. Qualitative data is data presented in the form of spoken words rather than in the form of numbers. As for what includes qualitative data in this study, namely, an overview of solar power plants, a brief history of photovoltaic cells, and the state of the local community. Quantitative data is a type of data that can be measured or calculated directly in the form of information or explanations expressed by numbers or in the form of numbers. As for the quantitative data, namely the amount of electricity needs of simple houses in Sukadaya Village, the intensity of solar radiation, current and voltage of photovoltaic cell output, the amount of costs used for the construction of solar power generation systems for simple homes.

RESULTS

Calculate the total usage load power per day, determine the size of photovoltaic cell capacity by the load of use, determine battery capacity, analysis of results and evaluation.

The research began with interviews with residents in Sukadaya Village about plans for electricity consumption needs for lighting and other electronic equipment, then the manufacture of photovoltaic cell mount frames used for testing. It then connects each component such as photovoltaic cells, *solar charger chontrollers,*inverters, batteries and loads and measuring instruments (multimeters and pyranometers). Data collection is carried out every hour starting from 08.00 *Wita* to 16.00 *Wita* by recording measurement variables in the form of solar radiation intensity, voltage, and photovoltaic cell output current. The data are needed to calculate the average energy potential utilized in Sukadaya Village in fill *factor,*outputpower, entry power and photovoltaic cell efficiency. The analysis was conducted by referring to interviews on residents and solar energy potential in Sukadaya Village.

Photovoltaic cells work with the photoelectric effect on semiconductor materials to convert light energy into electrical energy. In Maxwell's theory of electromagnetic radiation, light can be thought of as a spectrum of electromagnetic waves of different wavelengths. The working principle of semiconductors as photovoltaic cells is similar to diodes as pn-junctions. Pn-junction is a combined p and n type semiconductor layer obtained by doping on pure silicon. In p-type semiconductors, holes are formed (positive electric charge carriers) more numerous than the number of electrons, so the hole is the majority charge carrier, while the electron is a minority charge carrier. The same is true of n-type semiconductors. When part p of the pn-junction is connected to the battery's positive pole and part n is connected to the negative pole of the battery, then the current can flow through the pn-junction. This condition is referred to as advanced panjar. When the opposite is done (reverse panjar), i.e. part n of the pn-junction is connected to the battery's positive pole and part p is connected to the negative pole of the battery, then the current cannot flow through the pn-junction. However, there are still currents in tiny sizes that can still flow (in microamper sizes) called Leaking currents.

This solar power plant is designed to refer to interviews with residents in

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Sukadaya Village to meet the electricity needs of simple homes in the area. The total electricity needs of residential homes in Sukadaya Village are shown in table 1.

No.	**Name**	**Power of each Load *(Watt)***	**Old*(h/day)***	**Load *(Wh/day)***
1	Lamp LED	5	6	180
4	Television/ TV LED	28	5	140
6	Rice Cooker	50	1	50
7	Dispenser	80	1	80
8	HP	4	3	36
9	Iron	100	1	100
11	Fan	35	3	210
Total usage load power per day *(Wh/day)*				**796**
Total usage load power per day + 10%*(Wh/day)*				**875,6**

Table 1. calculation of total housing power needs is simple

Table 1 results of the calculation of the total usage power of each house per day can be obtained from the total load of usage that is = 796 *Wh / day,*because the installation circuit also requires power at the time of operation then the total load of use is added 10% so that the total usage load becomes; 796 + 139.6 = 875.6*Wh / day*.

Photovoltaic cells that are planned to be used in this system are photovoltaic cells with a capacity of 50 *Wp* assuming solar irradiation that is 9 *Hours / day,*so the number of photovoltaic cells needed to meet thepower needs of each house living in Sukadaya Village is as follows:

$$S_f = \frac{875,6}{(50 \times 9)}$$

$$= \frac{875,6}{450}$$

$$= 1.945778$$

$$= 1 \text{ panel}$$

The number of 12 *Volt* battery needs with a capacity of 300 Aheach. Minimum battery needs (battery power is only used about 50% to fulfill electricity needs), so

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the power needs. will be multiplied by 2 x fold,

1,945778x 2 =3,891556,

$$\frac{3{,}891556}{(12 \times 300}$$

$$\frac{3{,}891556}{3600}$$

0,00054 = 1 baterai 352 Ah

No.	Kind Thing	Specific give	Sum	Sum *(Rp)*
1	Photovoltaic Cells aik	50 *Wp*	4	600,000
2	Battery	12 *V* 300 *Ah*	2	200,000
3	Kontroller	10 *A*	1	50.000
4	Inverter	12 *VDC* 1000 *W*	1	200,000
5	Installation	-	1	200.000

Table 3. Total cost of PLTS independently

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Figure 1. Assembly Process

Figure 2. Implementation of Solar Cell Socialization

CONCLUSION

Based on the results of interviews with residents in Sukadaya Village and the tests and analysis that have been done, several conclusions can be drawn, namely:

1.From the results of interviews about electronic equipment planned to be used by the residents in Sukadaya Village and the results of calculations, the total power needs for each house live simply in Sukadaya Village per day which is 1396 Wh / day.

2.The design of a self-contained solar power plant (PLTS) system for simple residential homes in Sukadaya Village was obtained based on total power needs taking into account weather and power needs on the system which included 50 Wp photovoltaic cell components (4 panels), 12 VDC 300 Ah (2 units), Solar Charger Controller 10 A (1 Unit), Inverter 12 VDC 1000 W (1 unit), and installation.

3.The estimated total budget invested for constructing a simple residential scale solar power plant system in Sukadaya Village is Rp 1,25000 or 52,083 rupiah per month with the length of use of the solar power plant system effectively 2 years because the average battery component life for 2 years.

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