


Training and Installation of Solar Power Public Street Lighting for Karang Taruna at Bareng Village Klojen Malang Districts

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Abstract	Article Info
<p>To improve security for residents in the area at Bareng Village Klojen Malang Districts, one of the most important is lighting. The installation of public street lighting is still minimal, so it is far from meeting security and safety standards. In order to ensure the availability of safe and reliable street lighting, training on the assembly of solar-powered street lighting lamps (PJU) was carried out for members of the youth group RT10 RW 08 at Bareng Village Klojen Malang Districts. Prior to the assembly process for street lighting, a brief training was conducted on the assembly of solar-powered PJU light poles and their installation. Hence, they have skills that can be developed people. The result of assistance giving an increasing knowledge and skills of residents of RT10 RW 08 at Bareng Village Klojen Malang Districts. This place in the fabrication and installation of solar-powered PJU lights. In addition, the installation of 3 Solar Powered PJU lights that are safe and reliable, and have an impact on increasing environmental security and residents' activities.</p>	<p><i>Article History</i> <i>Received:</i> <i>October 29, 2021</i> <i>Revised:</i> <i>February 28, 2022</i> <i>Accepted:</i> <i>March 12, 2022</i></p> <p><i>Keywords:</i> Solar Power, Public Street Lighting, Installation Solar Power</p>
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INTRODUCTION

Klojen Malang is located in an area that is relatively higher than other areas in the city of Malang. Even so, this area is included in the northern region that is developing in the city of Malang because it is close to the city of Batu. With the increasing number of immigrants, there are excesses, both positive and negative. One of the negative excesses is the safety factor. To improve security for residents in the area of RT10 RW 08 kel. Together with the district. Klojen Malang, one of the most important is lighting. The installation of public street lighting actually already exists but is still minimal, it will be easy to provoke crime. Installation of perfunctory street lighting, which is only attached to a wall or tree with a wire, so it is very dangerous if a short circuit occurs, especially when entering the rainy season like today.

With the conditions as described above, in order to improve the skills of the residents of RT10 RW 08 kel. Together with the district. Klojen Malang, and in order to ensure the availability of safe and reliable street lighting, training on the assembly of public street lighting was carried out. Prior to the assembly process for street lighting, a brief training was conducted on assembling solar-powered PJU lampposts and their installation by a teacher at the State Polytechnic of Malang.

This activity has a positive impact on residents around RT10 RW 08 kel. Together with the district. Klojen Malang, universities and local governments, especially Batu City, socially and environmentally. This is because Solar Powered Public Street Lighting is a cheap and efficient

alternative to be used as a source of lighting electricity because it uses a free and unlimited energy source from nature, namely solar energy. Solar-powered street lighting uses solar panels with a service life of up to 25 years, which functions to receive sunlight (light) from the sun which is then converted into electricity through the photovoltaic process. Then stored in the battery so that it does not require a supply from the PLN, it can automatically start up in the afternoon and turn off in the morning with easy and efficient maintenance for years. Overall this system is designed to provide general lighting with renewable energy sources, free of maintenance costs, and has a long economic life.

Solar street lighting generally uses LED (Light Emitting Diode) lamps which have less power and are efficient. The use of hi-power type LED lights that are very bright, energy efficient, and durable. The lifetime of the LED lamp can reach 50,000 hours with a DC (Direct Current) power source. The long interval of changing the lamp also means reducing the frequency and saving operational costs of maintenance for the cost of replacing the bulbs. The batteries used for solar-powered street lighting are maintenance free batteries of the VRLA type and the Deep Cycle type. By using this device, you already have your own energy source without dependence on other parties, save fuel, and are environmentally friendly. Solar-powered public street lighting operates independently and does not require a network cable between poles so that its installation is very easy, practical, economical, and of course it can avoid power outages [4]. With a quick and easy installation system, solar powered street lighting can be a quick solution in overcoming the needs of public street lighting.

During the day, sunlight is converted into electric current by solar panels. The electric current is supplied to the battery through the SCC (Solar Charge Controller) as a current regulator and keeps the battery from over-discharging. At night, the light will turn on by taking the electrical energy stored in the battery during the day. The electric current from the battery to the lamp flows through the SCC so that the electric current remains stable [6]. The lighting in question is a complete unit consisting of a light source (lamp/luminaire), optical elements (reflector, refractor, diffuser). Electrical elements (connector to the power supply, etc.), a supporting structure consisting of a support arm, a vertical truss and a lamp post foundation.

In planning the installation of street lighting, it must be in accordance with the standards and provisions that have been applied. In Indonesia, this provision is called SNI (Indonesian National Standard). The pole is the component used to support the lamp. Several types of poles used for street lights are iron poles and octagonal poles. Based on the Indonesian National Standard (SNI 7391:2008) Specifications for Street Lighting in Urban Areas, street light poles can be divided into 3, namely single arm, double arm, and armless. While the types of light sources, public street lighting can also be divided into 3 (three) types, namely mercury lamps, sodium lamps.

METHOD

implementation of PKM activities is carried out in the Karang Taruna area of RT10 RW 08 kel. Together with the district. Klojen Malang. Karang Taruna RT10 RW 08 kel. Together with the district. Klojen Malang named father Muhammad Mahfud. The implementation time starts from April 1, 2021 to November 15, 2021. Methods to be carried out in this PKM activity include:

1. Field surveys to study existing problems and then provide offers on Public Street Lighting Lamp Assembly Training (PJU) Solar Powered.
2. The next activity is the preparation of proposals for proposed activities to the P2M Technical Implementation Unit of the State Polytechnic of Malang.
3. After obtaining approval, welding training activities are carried out with Solar-Powered Public Street Lighting Products (PJU) The methods to be carried out in this PKM activity include:
4. Field surveys to study existing problems and then provide offers on General Street Lighting Lamp Assembly Training (PJU)) Solar Powered

5. The next activity is the preparation of proposals for proposed activities to the P2M Technical Implementation Unit of the State Polytechnic of Malang.
6. After obtaining approval, welding training activities were carried out with Solar Powered Public Street Lights (PJU) products.

RESULTS AND DISCUSSION

Based on the activity evaluation plan, the stages of the implementation of science and technology service activities along with the achievement of success indicators are described as follows:

1. Coordination

On 3 and 5 May 2021, the service team coordinated with the head of Karang Taruna RT10 RW 08 kel. Together with the district. Klojen Malang as the location for the installation of solar cell lights. The service team synchronizes the schedule with the Karang Taruna RT10 RW 08 kel. Together with the district. Klojen Malang, what materials are needed. From the results of the coordination, the service team prepared a solar cell system package. The service team carried out community service for 4 meetings including training on what solar cell is, training on assembling electrical circuits.

2. Training and installation of solar cell lights in the area of RT 10 RW 08

Bareng Village, Klojen Subdistrict, Malang. Due to the constraints of the ongoing PPKM, the process of installing the lights for the Public Prosecutor was a bit late, but it was finally completed by the end of August 2021. Delivery and training for the installation of 3 solar cell packages. The implementation was carried out on August 21, 2021. This training was attended by members and administrators of Karang Taruna RT 10 RW 08 Bareng Village, Klojen Subdistrict, Malang.



Figure 1. Service team Together with youth organization staff fabricating solar cell poles q



Figure 2. The Service Team and Karang Taruna members are installing solar chell lights at location 2



Figure 3. The Service Team and members of the youth organization are installing solar chell lights at location 1



Figure 5. The Service Team and members of the youth organization are installing solar chell lights at the location



Figure 7. night conditions of the diesel chell lights at location1

Figure 4. The Service Team and members of the youth organization are installing solar chell lights at location 2



Figure 6. Handing over the Remote Control of the chell solar lights to the Karang Taruna administrators



Figure 8. night conditions of the diesel chell lights at location 2

Benefits obtained from training activities for installing solar street lighting (PJU) powered by solar in the area of RT 10 RW 08 Kelurahan Together with Klojen Sub-district, Malang are:

1. Residents of RT 10 RW 08 Bareng Village, Klojen Sub-district, Malang get have knowledge and skills in the fabrication and installation of solar-powered PJU lamps.
2. Environmental security and residents' activities at night in the neighborhood of RT 10 RW 08 Bareng Village, Klojen Subdistrict, Malang are getting better.

Solar energy is a promising energy in the future. However, the utilization of solar energy is still not optimal. This can be observed by wasting solar energy naturally at this time. In addition, the community still does not know about how to build, work and maintain PV mini-grid systems. Therefore, training is needed as a solution to the problems that occur. The training provides benefits, among others, the community can make/assemble PLTS as street lighting, repair if there is damage and reduce crime rates. The lack of street lighting will result in an increase in the crime rate.

Public Street Lighting (PJU) is part of the complementary road building which can be installed on the left or right of the road and or in the middle (at the median part of the road) which used to light the way or environment around the road (Thiel, G. G., Ensslin, S. R., & Ensslin, L. 2017; Ardiansyah, et al., 2020. Public Street Lighting Solar powered is an alternative cheap and economical to use as a source of lighting power because use free and unreliable energy sources

limited from nature, namely solar energy. Light solar powered public street lighting using solar panels with a lifetime which can reach 25 years, which works receive the light of the sun then converted into electricity through the process photovoltaic. Then stored in battery so it does not require a supply from PLN, can automatically start to light up in the afternoon day and goes out in the morning with easy and efficient maintenance during many years. Overall this system designed for light supply general lighting with energy source renewable, maintenance free, and long economic life. Solar powered street lighting generally use LED lights (Light Emitting Diode) has more power few and efficient. Use of LED lights Hi-power type that is very bright, saving energy, and durable (Liu, et al., 2019; Plonsky, et al., 2013). Usage period LED light can reach 50,000 hours with DC (Direct Current) power source. duration lamp replacement interval means too reduce frequency and save cost maintenance operations for service fees replacement of the bulb. battery that used for street lighting common solar powered is battery free VRLA type maintenance (maintenance free) deep cycle type.

By using this device, already has an energy source alone without dependence on other parties fuel efficient and environmentally friendly. Light solar powered public street lighting operate independently and not need a network cable between poles so that the installation becomes very easy, practical, economical, and of course can be avoided from a power outage (Khalil, et al., 2017; Rajab, et al., 2017). With system quick and easy installation, lamp solar powered public street lighting can be be a quick solution in overcoming street lighting needs. Considerations using public street lighting LED based solar powered: 1.Durability of solar panels and LED modules 2.It is independent, without power network electricity 3.Using solar energy 4.Environmentally friendly 5.Installation is very easy 6.Save maintenance costs. Easy to move, current regulator and keep it from happening over-discharge of the battery. At night, the lamp will light up by taking energy electricity stored in the battery during the day day. Electric current from the battery to the lamp flows through the SCC so that the electric current remains stable. The lighting in question is a complete unit consisting of sources light (lamp/luminaire), optical elements (reflectors/reflectors, refractors/refractors, diffuser/diffuser). Electrical elements (connector to the power source / power supply. etc.), a support structure consisting of an arm truss, vertical truss and foundation light poles. In installation planning street lighting must be properly applicable standards and regulations. In Indonesia, this provision is called SNI (Indonesian National Standard). Pole is the component used for support the lamp. Several types of poles used for street lamps are iron poles and octagonal pillars. By Standard Indonesian National (SNI 7391:2008) Specifications of Street Lighting in the Area Urban, street light poles can be divided into 3, namely single arm, double arm, and sleeveless

CONCLUSION

The conclusions of the Solar Powered Public Street Lighting (PJU) Training activity in RT 10 RW 08 Bareng Village, Klojen Subdistrict, Malang are: Increased knowledge and skills of residents of RT 10 RW 08 Bareng Village, Klojen Malang District in the field of fabrication and the installation of solar powered PJU lights. Installation of 3 safe and reliable Solar Powered PJU lamps, each of which requires a 2 m high lamp post, 300 W LED lamp with DC 12V voltage, 50 WP Solar Panel, this has an impact on increasing environmental security and residents' activities in at night in the neighborhood of RT 10 RW 08 Bareng Village, Klojen Subdistrict, Malang.

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