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Design and Development of Alternative Energy Sources: Solar Power Plant in Kalandrina Selosia Residential Area RT 008 / RW 008 Jayamukti Village

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Abstract

Purpose: This research paper aims to introduce a solar power plant in Kalandrina Selosia's residential area, addressing local energy needs sustainably. The study's significance lies in offering a renewable energy solution within a community context.

Method: The research used experimental and descriptive methods to measure solar panel output and intensity alongside assessing electrical installations. Analytical techniques evaluated the system's functionality.

Practical Applications: The designed 50-watt solar power plant showcases the feasibility of local solar energy generation. Its potential to reduce costs and environmental impact holds practical implications for communities lacking conventional power sources.

Conclusion: This study successfully demonstrates solar power's viability in Kalandrina Selosia. The project contributes practical insight into renewable energy adoption, benefiting the community and broader understanding.

Introduction

Electricity is a crucial energy source for humanity today due to its extensive use in various devices, making it the primary source of power (Kufeoglu dkk., 2018). The discovery of electricity dates back to 1971, when Michael Faraday in England made significant strides (Jamzuri, 2013). As we approached the 1990s, electricity derived solely from electric motors saw advancements with the development of steam-powered generators, wind turbines, hydroelectric power plants, and even the emerging trend of waste-based power plants.

The journey of electricity's discovery traces back to 1791 when Luigi Galvani conducted pioneering experiments with animal tissues and metal components, leading to the understanding of "animal electricity" (Volta dkk., 2013). Subsequent breakthroughs by Alessandro Volta culminated in the invention of the voltaic pile, an early form of battery. These foundational discoveries paved the way for electrodynamics and the development of various applications over the centuries (Soeiro, 2013). However, it was not until 1879, when Thomas Edison successfully patented the incandescent light bulb, that the practical harnessing of electricity for illumination truly began. Edison's innovation heralded a new era, triggering the rapid electrification of urban centers and fundamentally transforming human lifestyles (Forrester, 2016).

Today, electricity remains a linchpin of global progress, shaping economies, enhancing communication, and providing essential services. Electricity is a quintessential energy source in today's world, permeating virtually every facet of human existence. Its indispensability is underpinned by the extensive utilization of electrical devices, making electricity the lifeblood of modern society. Electricity's significance is unparalleled, from powering homes, industries, and communication systems to driving innovations in technology and healthcare. As societies grapple with the challenges posed by climate change and the imperative for sustainable energy sources, the focus on renewable energy has intensified. In this context, solar power has emerged as a beacon of hope, capitalizing on the boundless energy radiated by the sun.

The development of solar photovoltaic (PV) technology has revolutionized how we capture and convert solar energy into usable electricity (Subiyanto, 2014). Harnessing sunlight through PV cells has become more efficient and increasingly affordable, making solar power an accessible and environmentally friendly energy solution (Noer et al.., 2022). Solar-powered generators are prevalent around us, primarily utilizing sunlight through solar cells, which harness solar energy at no cost (Oguz dkk., 2015). In Indonesia, solar power systems, commonly known as solar systems, are recognized as having battery storage for daytime-generated electricity, which is stored and reused during the night when the sun is absent.

During this Real Work Lecture, we focused on creating solar-powered energy storage, akin to a power bank, designed to store electricity for on-demand use, especially during power outages. This concept arose from the local community's needs, aiming to address prevalent challenges in the area.

Method

Our activities during the Community Service Program (*KKN*) encompassed the stages of Preparation, Implementation, Monitoring, and Evaluation. These can be outlined as follows:

1. Preparation
   We initiated our *KKN* by surveying the target location for our planned program. After discussions and considering various alternatives for activities in the local area, we decided to focus on providing an alternative energy source using solar energy (solar cells). This decision was based on the lack of lighting in the local Posyandu (community health center) area and suggestions from the local secretariat. Upon arriving at the *KKN* site, we undertook several preparations before commencing the *KKN* program.
2. Program Identification
   We arrived at the *KKN* location on Sunday, April 4, 2021. The following day, we

identified the programs to be carried out over two months. The program planning served as a reference for executing subsequent activities. The planned programs resulted from collaborative brainstorming involving Group 4 of the *KKN* team and local community input. The program identification phase spanned two months.

3. *KKN* Program Socialization
   After identifying the programs and finalizing the program plan, we conducted a socialization of the planned activities during the *KKN* period in the Kalandrina-Selosia Housing Complex on the Monday evening following our arrival. The meeting with the residents was held on Sunday, April 4, at 8:00 PM.

Throughout the *KKN* period, we actively engaged in these activities as part of our commitment to fostering positive impact and sustainable development within the community. In addition to presenting the planned program activities for the *KKN* period, the program plan comprised several initiatives, including:

1. Implementing the acquisition of alternative energy in the form of solar power.
2. Conducting socialization on waste management within the Kalandrina-Selosia community.

Result

The conducted activity was titled "Alternative Energy." Its primary objective was to raise awareness about the importance of alternative energy sources when the primary energy supply is unavailable while highlighting the positive environmental impact of such sources. The activity provided the local community with an understanding of how alternative energy can serve as a reliable backup when the primary energy source is not accessible.

In addition to its educational goals, the program also involved procuring alternative energy sources. The initiative aimed to inform the community about the significance of integrating alternative energy solutions into their daily lives, mainly due to the uncertainty surrounding the availability of the primary energy source. The activity spanned from April 11, 2021, to May 23, 2021, ensuring sufficient time for engagement and learning.

The activity focused on installing alternative energy sources at a community gathering center known as the "Balai Ruing," a central point for residents to come together. Beyond the installation aspect, the program aimed to educate the community about solar cells and their practical applications. This holistic approach aimed to empower the community with the knowledge and resources needed to embrace alternative energy solutions and contribute to a more sustainable energy future.

Here are some components used in the production of solar energy:

No.	Name	Figure
1.	Solar Charge Controller	

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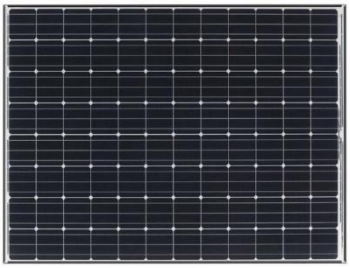
2.	Inventor	
3.	ACCU	
4.	MCB	
5.	Solar Panel	
6.	Panel Box	

Figure 1. Installation of *KKN* Posts

Figure 2. Assembly of Solar Panels

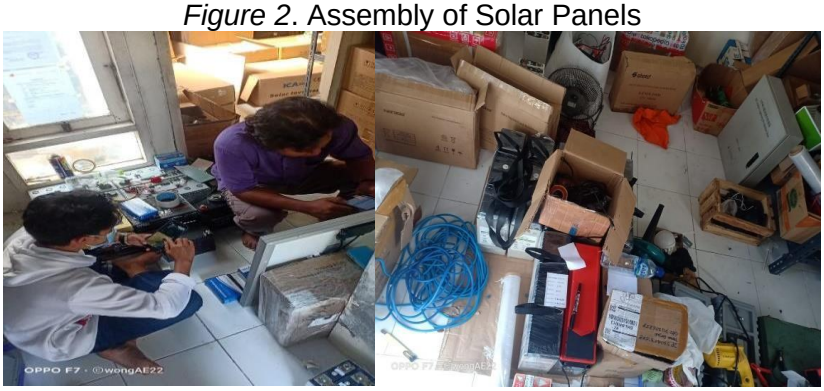


Figure 3. Solar Panel Installation

Figure 4. Symbolic Handover

Discussion

The Community Service Program (*KKN*), as a form of service to the community, involves providing or developing alternative energy in the form of solar-powered electricity, commonly referred to as solar cells, and creating a database for residents of RT 08. During the implementation of *KKN* from April to May, the goal is to introduce a quickly produced and efficient alternative energy source.

The *KKN* program we conducted in the village of Jayamukti aims to make alternative energy more familiar to the residents of RT 08 and attract more users of this alternative energy source to install it in areas considered necessary by the community. Furthermore, implementing this alternative energy source can reduce excessive electricity consumption. Excessive electricity use can have adverse effects on our planet, as we are aware that it can contribute to environmental degradation through irresponsible industrial waste and air pollution, which can gradually deplete the Earth's ozone layer (Almaktar dkk., 2020) (Găiceanu, 2019).

Throughout the *KKN* activities, we had planned several programs from the beginning to the end. However, there were obstacles in the field, such as the educational program initially scheduled for Sunday evenings during *KKN*, which could not proceed as planned due to the overlap with Taraweeh prayers. Additionally, the planned 110-watt solar cell or solar energy from sunlight was reduced to 50 watts due to accommodation and budget constraints.

Conclusion

Solar-powered alternative energy has proven to be efficient and effective in replacing the main electricity supply when the main power is out, and it is easier and safer to maintain. The drawback of solar-powered alternative energy is that sunlight is less efficient as an energy source during the rainy season with high rainfall and frequent cloud cover.

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Reference

Almaktar, M., Hussein, T., Rahman, H. A., & Albreki, A. M. (2020). Advantages of Utilizing the Solar Water Heating Technology in Reducing Total Electricity Consumption and Improving Grid Efficiency: A Case Study of Benghazi, Libya. *2020 11th International Renewable Energy Congress (IREC)*, 1–5. https://doi.org/10.1109/IREC48820.2020.9310393

Forrester, R. (2016). History of Electricity. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2876929

Găiceanu, M. (2019). *Introductory Chapter: Electric Power Conversion*. https://doi.org/10.5772/intechopen.84410

Jamzuri, J. (2013, September 14). *Desain Signal Generator untuk Uji Kelistrikan Tubuh*. https://www.semanticscholar.org/paper/Desain-Signal-Generator-untuk-Uji-Kelistrikan-Tubuh-Jamzuri/1b12a4827207ba5512554d5f2ffc9c9e7d778b43

Kufeoglu, S., Pollitt, M., & Anaya, K. (2018, Agustus 16). *Electric Power Distribution in the World: Today and Tomorrow*. https://doi.org/10.17863/CAM.27667

Noer Soedjarwanto, Endah Komalasari, & Syuja Asyraf Fardhan. (2022). Studi Kelayakan Pembangkit Listrik Tenaga Surya (Plts) Dengan Baterai Dan Terhubung Grid Di Nias, Sumatera Utara. *Jurnal Teknik Ilmu Dan Aplikasi*, *3*(2), 1–7. https://doi.org/10.33795/jtia.v1i1.91

Oguz, Y., Sahin, M., Sahin, E., & Guven, Y. (2015). Importance Of Solar Lighting Systems In

Terms Of Environmental Pollution. *Balkan Journal of Electrical and Computer Engineering*, *3*(4). https://doi.org/10.17694/bajece.51190

Soeiro, D. (2013). *On Artificial and Animal Electricity: Alessandro Volta vs. Luigi Galvani*. https://www.semanticscholar.org/paper/On-Artificial-and-Animal-Electricity-%3A-Alessandro-Soeiro/362b053724705ce909a7b34a3accfd20c884bbeb

Subiyanto, S. (2014). *Model Sistem Pembangkit Listrik Tenaga Surya Terpadu Dengan Baterai Terhubung Jaringan Listrik*. Https://Www.Semanticscholar.Org/Paper/Model-Sistem-Pembangkit-Listrik-Tenaga-Surya-Dengan-Subiyanto/c6fdd7f06d1f6d09362a49abbd32da4717bbc2c8

Volta, A., Galvani, L., & Soeiro, D. (2013). *On Artificial and Animal Electricity*. https://www.semanticscholar.org/paper/On-Artificial-and-Animal-Electricity-Volta-Galvani/b5d73aac8834d2b769b52ef228bc5c294e7cf9ae