The development of environmental knowledge and the use of solar energy using environmental responsibility behavior in Central Java

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Abstract. Energy has an essential meaning in life to continue to develop and support economic and environmental activities. Every year energy in Indonesia increases rapidly in line with human growth. To supply energy needs, renewable energy sources must be developed. Renewable energy potentials such as solar energy have never been used on a large scale even though Indonesia has enormous energy potential. Solar energy can be used in the form of solar cells for electricity generation. The utilization of solar cells can help people who live in remote areas far from the electricity network. This research was conducted in Central Java by using descriptive qualitative methods and using research and development (R&D) methods. The technique used is an expressive qualitative analysis technique. The result solution implemented is to meet the increasing electrical energy needs of the community. This research produces renewable energy that can be used as a solution to solving the electrical energy crisis at an affordable cost and can increase the independence of the community so that it does not depend on government electricity supply and improve environmental responsibility behavior.

1. Introduction

Nobody denies that energy is something that cannot be separated from life. It is often stated that power is a vital part of life. The availability of an independent source of energy to carry out various activities in our lives. Both need and utilize each other. Power exists because of experience. Life also exists because of power. Therefore, when talking about the energy it is the same as discussing growth and its sustainability.

Today, renewable energy is an essential need and cannot be delayed anymore. We can no longer depend on fossil energy. In addition to being non-renewable, the availability of fossil energy sources is also diminishing in both Indonesia and the world. According to some experts, with the current consumption pattern, in just a dozen to ten years, Indonesia's oil and gas reserves will run out. This can be seen in part from the rise in domestic oil prices and the volatility of oil prices on the international market. Therefore, for the sake of the continuation of human life and anticipating energy scarcity, efforts towards renewable energy processing are the best alternative to do.
The purpose of this study is to develop environmental knowledge and the use of solar energy with environmental responsibility behavior as a solution to the energy crisis in the future, especially for household needs.

Utilization: 1) Solar cells can help people who live in remote areas far from the electricity grid, 2) Easy to develop, 3) Does not damage nature, 4) can be used for an extended period, 5) Abundantly available, 6) Energy sources can be used free of charge with appropriate technology investments, 7) help boost the economy and create job opportunities, 8) do not require much maintenance and reduce operating costs, 9) Energy independent does not need to import fuel from third countries.

Based on existing researchers, one of which was done by Ali Syaban [1]. The results of the application of environmental education students can have behaviors that will care about the environment from aspects of knowledge, attitudes, and skills to be able to respond to care for and preserve the surrounding environment.

Research conducted by Haris et al entitled Cooling for Increasing the Output Power of Solar Panels. The research resulted is that overall, when the temperature drops, the voltage of the open circuit, the energy when the maximum power and maximum power increase [2].

Research conducted by Deni Septiadi, et al entitled Projection of Solar Energy Potential as Renewable Energy [3]. In this research, energy diversification is a step that must be taken to obtain other sources, thereby reducing dependence on fossil sources. To get a real picture of solar energy, it is necessary to conduct a spatial analysis of the distribution of solar energy potential for the whole of Indonesia and Ambon in particular. By combining the Kriging technique and the Point Successive Over-Relaxation (PSOR) literacy method, it is expected to show mapping projections with better resolution. Previously the secondary data was optimized by using the Curve Fitting model.

2. Method

This research was carried out in Central Java using descriptive qualitative methods in which the resulting product was in the form of a solar panel usage book for household needs. This research uses research and development (R&D) methods. The technique used is a descriptive qualitative analysis technique.

This study uses Borg and Gall Research and development in sons as follows: (1) Preliminary Study; Development stages, (2) Planning, (3) Initial Production, (4) Field trials, (5) Major Product Revisions, (6) Main field trials, (7) Revisions to operational products, (8) Operational field trials, (9) Revision of the final product, (10) Reporting and disseminating the product [4].

![Figure 1. Research flow diagram.](image)

3. Results and discussion

The results of this study are the development of environmental knowledge and the use of solar energy with environmental responsibility behavior, which will be produced in the form of a book on the use of solar panels to facilitate the public, especially households, in using alternative electricity and ease electricity payments in each home. Increased knowledge and benefits of using solar power can help
people who live in remote areas far from the electricity grid, easy to develop, does not damage nature, can be used for an extended period, available abundantly, energy sources can be used free of charge with appropriate technology investments, help drive the economy and create job opportunities, do not require much maintenance and reduce household operational costs.

3.1. Overview of current conditions
Energy is a basic human need, which continues to increase in line with the level of life. Oil fuel/fossil energy is one of the non-renewable energy sources, which has been a mainstay to meet energy needs in all sectors of activity. The wealth of energy resources in Indonesia, namely the sun, can be used as alternative energy, replacing dependence on fuel oil, which is increasingly limited both in number and reserves. Fuel oil holds a very dominant position in meeting domestic energy needs. It must be realized now that Indonesia has imported crude oil and fuel oil to meet those needs. The energy crisis that hit the world has an impact. The high price of world crude oil has a direct effect on economic activity. The wealth of energy resources, especially new and renewable energy sources that we have, need to be considered to be utilized as alternative energy, replacing and reducing the role of fuel oil in energy consumption in Indonesia.

3.2. Solution that has been implemented
The government has endeavored to continue providing services for electricity needs for the people of Indonesia. The service effort was carried out with the formation of the State Electricity Company (PLN). This is by Article 33 of the 1945 Constitution, which mandates that all matters relating to the life of the general public be regulated by the government. Concrete steps that have been taken in meeting the electricity needs of the community is to increase electricity production. But technically, electricity generation is only dominated by non-renewable fossil energy. Also, the government has taken the power outage policy of blackouts due to the energy crisis. Some of the reasons that caused the power outage steps are made including the limited power generation, both owned by PT PLN (Persero) and the private sector, the power plant that is not operating optimally due to damage, electricity power deficit, or interference with disruption to the generator or network connected.

3.3. Level of success of ideas
The idea of the concept of alternative energy sources for electricity generation is in the form of a book on the use of solar panels, specifically for households to meet the increasing electricity needs at home. This idea can also reduce the use of non-renewable energy sources for electricity generation and mitigate the consequences arising from the use of fossil fuels. Solar Panel is a tool that can be made by the community and low-cost. Solar panels do not require complicated infrastructure like other alternative power plants so that people can make these tools independently at home by using an electric generator and using batteries as a source of energy for storing heat to minimize the risk of danger.

4. Conclusion
Conclusions that can be drawn from this paper are (1) Solar Energy in the form of solar panels can spur increased community independence so as not to depend on government electricity supplies. (2) Renewable energy in the form of solar panels can be used as a solution to solving the low-cost electricity crisis.

Renewable energy in the form of solar panels can be used as a primary means of fulfilling daily household electricity needs because it still needs to be accompanied by existing electricity sources. It is expected that the government will make it on a large scale for households and industries. It is necessary to be aware of the potential of solar panel resources to the community. It is essential to disseminate the concept of using solar panels so that they can be applied to the broader community.

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