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An Installation of A Solar Power Plant in Selayang Baru Village, Langkat District

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ABSTRACT
The Langkat Regency Government has collaborated with PLN to meet electricity needs in remote villages, but there are several obstacles, so these efforts cannot be achieved evenly. Therefore, in efforts to improve the quality of life and economic growth of rural communities, energy has a big role. Where this research discusses the availability of electricity in rural areas, it is hoped that it can encourage increased productivity, improve educational facilities, worship, health, as well as foster new economic activities. In order to meet the energy needs of rural communities, local governments are trying to implement various energy infrastructure development activities by utilizing the potential of local energy sources. One potential energy that can be developed is solar power plants (PLTS) for electricity in rural areas. This service activity can essentially facilitate the procurement of PLTS equipment which will be placed in a Grand Mosque in Desan Selayang as a pilot.

Keywords: ***PLN, Community Economy, Solar Power Plant***

INTRODUCTION

Selayang is one of 14 villages in Finish District. The community's leading businesses include cooking oil and oleochemical processing, fruit processing industry, grouper fish business, windhu shrimp farming processing, tourism and livestock industries. Most of these businesses use PLN electricity sources. Likewise, facilities for places of worship must be supported by the presence of a PLN electricity source. The largest mosque in Selayang Village is located in a strategic location, namely close to the village office and traditional market. An electricity source is needed to carry out the call to prayer using an amplifier, a water pump for performing ablutions and bathroom needs and lamps for lighting at night. The obstacle faced by the community is the frequent occurrence of power outages for quite a long time. In order to meet the need for electricity sources, energy infrastructure development activities are carried out by utilizing the potential of local energy sources. One potential energy that can be developed is solar power generation.

Figure 1. Mosque in Selayang Village

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The transition from fossil energy to renewable energy experiences many obstacles in various ways, among others due to much higher prices in terms of investment, the need for experts in the development of renewable energy in technical terms, and also the lack of government intervention in terms of renewable energy development. As a consequence of the shrinking supply of petroleum and the high price of energy from renewable sources, people will face difficulties in carrying out economic activities or investing in renewable energy development. Alternative energy such as wind, water and solar [9]. In general, Indonesia is categorized as a windless country, given that the average minimum wind speed that can be economically developed as an energy service provider is 4 m/s and average wind speeds ranging from 3 m/s are adequate for small propeller wind turbines, above 5 m/s for medium wind turbines and above 6 m/s for large wind turbines.

However, there are some areas where wind energy sources are likely to be feasible. . When viewed for the city of Dumai, it has the potential for wind-sourced energy of 1.26 m / s which is considered not feasible for wind energy potential [1]. However, Indonesia has great potential for the development of hydropower as one of the utilization of renewable energy, around 3,105.76 MW is on the island of Java, because Indonesia's topographic conditions are mountainous and hilly and flowed by many rivers and certain areas have lakes or reservoirs that are quite potential as a source of water energy. The development of each type of power plant is based on the technical and economic feasibility of the power center as well as the results of environmental impact analysis studies. As a consideration is the availability of certain energy sources, the need for electrical energy demand, low generation costs and specific characteristics of each type of plant to support base load or peak load.

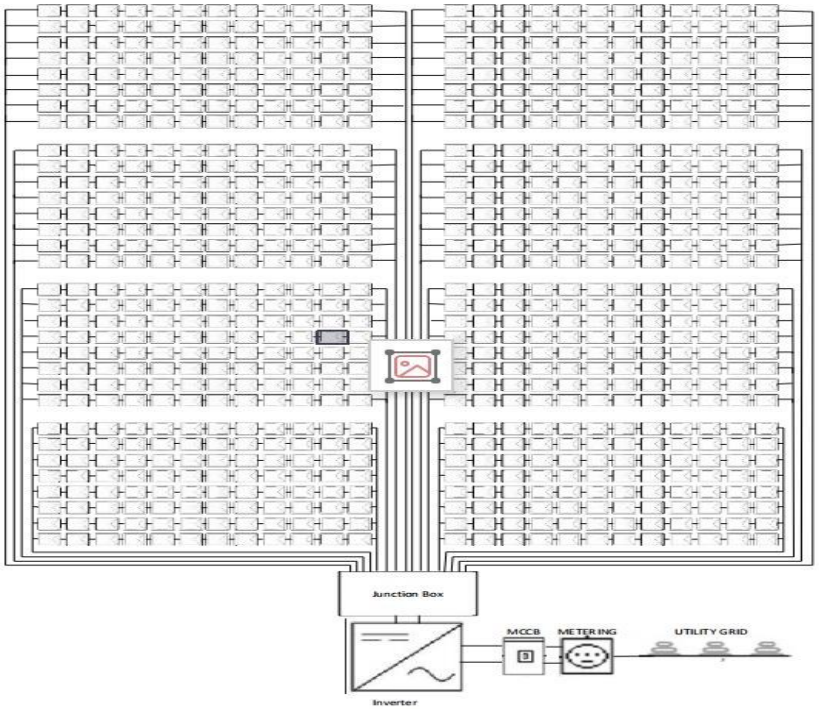

Figure 2. Plts System Grid

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METHODS

The stages of the activity implementation method are divided into three parts, namely:

1. Beginning of Implementation
   a. Data collection
      The data collection method is intended to obtain information related to the implementation of service activities so that the objectives to be achieved can be met. This data includes the number of village officials who are willing to take part in training and have computer equipment and are also able to use computers.
   b. Literature Study
      This method is carried out by looking for references for theoretical needs regarding this community service activity. Literature study was carried out by looking for books that suited the needs of community service activities.
   c. Needs Analysis
      At this stage, an analysis of the needs that can support the implementation of activities is carried out. Several aspects of the needs analysis include location, equipment, reading materials, information technology supporting equipment, skills of village officials and existing personnel in the Finish District area.
   d. Location Overview
      The proposing team visited the activity location as part of the implementation stage so that the team could find out the conditions of the field where the activity would be carried out. Location reviews can be carried out repeatedly to establish interactive communication with activity partners.
2. Implementation
   In carrying out activities, the method of delivering material directly with supporting equipment, group discussions and case studies can help participants better understand the training being delivered. These activities include activities including:
   a. Installation of solar power plants
   b. Training on installing solar power installations
   c. Solar power plant maintenance training.
3. Post Implementation
   Activities at this stage include:
   a. Evaluation of activities
      After completion of implementation and maintenance activities, re-evaluation activities are carried out, it is hoped that the community can maintain it well so that it can last a long time.
   b. Preparation of activity reports
      At this stage, all activities that have been carried out are compiled in an activity report

RESULTS AND DISCUSSION

It is hoped that the installation of a pilot solar power source installed at the mosque in Selayang Village will inspire and convince the community that electricity needs can be

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obtained in another way, namely by making their own electricity generator using solar cells. The difficulties experienced by the community regarding solar power plants include the knowledge required for installation, installation and maintenance which is provided in the form of training. In this way, business development carried out by the community can run continuously without experiencing disruption.

The analysis that will be carried out is planning the design of a PLTS system connected to the main system (On-Grid) which can serve the needs of new overhead loads. The analysis carried out is in the form of planning from a technical and economic perspective. From a technical perspective, the planning carried out concerns the design of a system that can serve electricity needs according to the existing load and standards at the mosque in Selayang Baru. The things used as a reference for the analysis are: 1. Basic system information (spare parts, power values, etc.). 2. System designer information. 3. System installer information. 4. Circuit design, including: a. Type and number of Modules. b. String Configuration. c. Cable specifications. d. Protection system. e. Junction box. 5. Module data specifications. 6. Inverter data specifications

After knowing the technical design of installing an on-grid PLTS system, the next step is to calculate how much it will cost to build the system. In technical economic analysis, the method used is often known as the technical economic analysis method. In this economic analysis, the author takes cost and time analysis as a reference and the benefit and cost ratio value analysis method as the subject of discussion which produces the analysis as:

Table 1. Cost and time analysis for PLTS system planning

Tahun	Cash Flow Cost (Rp)	Cash Flow Benefit (Rp)	NPV (Rp)
0	7.530.574.000		-7.530.574.000
1	1483572037	2.468.841.238	985.269.201
2	1.373.677.812	2.666.348.537	1.292.670.725
3	1.271.923.900	2.879.656.420	1.607.732.520
4	1.177.707.315	3.110.028.933	1.932.321.618
5	1.091.647.145	3.358.831.248	2.267.184.103
6	1.009.694.200	3.627.537.748	2.617.843.548
7	934.902.037	3.917.740.768	2.982.838.731
8	865.650.034	4.231.160.029	3.365.509.995
9	801.527.809	4.539.652.831	3.738.125.021
10	742.155.379	4.935.225.058	4.193.069.679
11	687.180.906	5.330.043.062	4.642.86.2155
12	636.278.617	5.750.446.507	5.114.167.890
13	589.146.867	6.216.962.228	5.627.815.360
14	545.506.359	6.714.319.206	6.168.812.847
15	505.643.848	7.251.464.743	6.745.820.894
16	467.683.778	7.831.581.922	7.363.898.144
17	433.040.535	8.458.108.476	8.025.067.940
18	400.963.458	9.134.757.154	8.733.793.695
19	371.262.461	5.865.537.726	5.494.275.264
20	343.761.538	10.654.780.744	10.311.019.205
Total			85.679.524.536

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CONCLUSION

Training on installing PLTS and its installation has been successfully carried out. It is hoped that the existence of this PLTS can become a model which can then be developed to meet alternative electricity needs for community business development. This success is demonstrated, among other things.

1. There is a compatibility between the activity plan proposed by the Selayang village head and the activities carried out by the community service team from Polmed, namely the realization of a pilot solar power plant.
2. There was a positive response considering the village's interest in helping the community in developing businesses that utilize electricity resources, especially in locations that are not connected to the PLN electricity network
3. The village head and village officials truly understand their role in developing the village and improving the standard of living of village communities through various businesses that utilize alternative electricity sources.

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