



The Concept of Application of Renewable Energy in Campus Area

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Abstract. Since ancient times, humans have relied heavily on fossil energy. Almost all industrial activities and daily activities are inseparable from dependence on non-renewable energy. Therefore, currently, it is being intensified with the utilization of renewable energy. This research aims to determine the technology-based renewable energy around the campus and open up insights into the use of renewable energy. This research method uses a qualitative descriptive approach. The results of this research are the introduction of renewable energy to the public, especially in the university environment. It is hoped that this research can be applied to renewable energy technology in the university environment. The conclusion from this renewable energy research can find new findings so that they have a contribution to science and education.

Keywords: Technology, Renewable Energy, Campus Area, Concept and Application

1. Introduction

The use of Energy in Indonesia is still dominated by non-renewable energy, which comes from fossils, namely coal and petroleum. Over time, fossil energy will be depleted, therefore to work around this with renewable energy [1,2]. On the other hand, universities, apart from being an institution that organizes professional academic education, are also one of the pathways for energy development.

According to data obtained from the Central Bureau of Statistics, the consumption of new and renewable energy in Indonesia still tends to be lower than the total energy consumption [3]. Even though Indonesia is a country with rich natural resources, renewable energy sources need to be implemented and developed, considering the role and price of fossil energy or fuel,

which is increasing and soaring as a substitute for sustainable energy providers [4]. The gasoline (BBM) price hike of up to US\$ 70 / barrel affected economic activity in numerous regions of the world. Electricity is a vital element of daily activities and an essential aspect of improving one's quality of life. Access to dependable and affordable power is a prerequisite for economic development and poverty alleviation. However, the majority of energy used to generate electricity currently still comes from non-renewable fossil fuels, such as coal, which accounts for up to 67% of the total. Gas, the second-largest power source, is then used, along with a variety of mixes of non-renewable and renewable energy sources. [5-9]. It's important to invest in finding alternative power from renewable energy. However, this research focuses on the invitation to universities to create renewable energy.

The increasing levels of CO₂, at their highest in 125,000 years, highlight the urgent need to transition to renewable energy sources. While the extent of remaining oil reserves is debated by experts, the harmful effects of CO₂ on global warming have been agreed upon almost groups. This puts every life on Earth at serious risk. Therefore, the development and implementation of environmentally friendly renewable fuels need serious attention [10-12]. This research method used a qualitative descriptive method. The results of this research are the introduction of renewable energy to the public, especially in the university environment. It is hoped that students and experts on campus can create breakthroughs in new and renewable energy technologies to be applied to the wider community.

2. Method

2.1. Research area

This research method used a qualitative descriptive method to determine how important new and renewable energy is. With this paper, it is hoped that universities can become examples in applying new and renewable energy technologies. This study also made observations, namely data collection by making direct observations at the university, conducting interviews by conducting direct questions and answers to parties related to the university, and conducting literature studies by collecting data from reference books and journals related to renewable energy.

3. Results and Discussion

Currently, it is important to return to the concept of back to nature, namely energy and technology that uses basic materials from nature and green technology that is friendly to the environment. Environmentally friendly technology is also the focus of researchers considering human activities, especially industrialization, have caused environmental pollution, and the world needs technology that is more environmentally friendly [13,14]. There have been many studies by academics in higher education about renewable energy but only stop scientific concepts, but not many have applied it. The following are renewable energy technologies that can be applied in universities.

3.1 Solo Panel

Using solar panels is a common example of the use of new and renewable energy technologies. With unlimited solar thermal resources, of course, it is a good means of making renewable energy. Several universities in Indonesia have used solar panels to reduce the use of conventional electrical energy. The electrical energy produced will usually be used for

electricity needs, and some are stored first with a battery. The workflow of a solar panel is shown in Figure 1.



Figure 1. Solar Panel Workflow

Resource from www.solarcellsurya.com

The way it works is that the solar panel first converts the sun's radiation rays into one-way electricity or DC current. The inverter converts the DC electricity into alternating current or AC current. The electricity that has been generated can be used for daily electricity use. The excess electricity can be stored or exported to PLN as a deposit with kWh of eczema.

By calculating the use of a Solar Cell with a capacity of 50 kW peak, the result will get 72,000 kWh / year by heating the sun 5 hours/day.

3.2 Biomias

Biomass is organic matter produced by plants through photosynthesis. It's often the leftover part after the main product is harvested. Examples include plants, trees, agricultural waste, and animal manure. (See Figure 2).

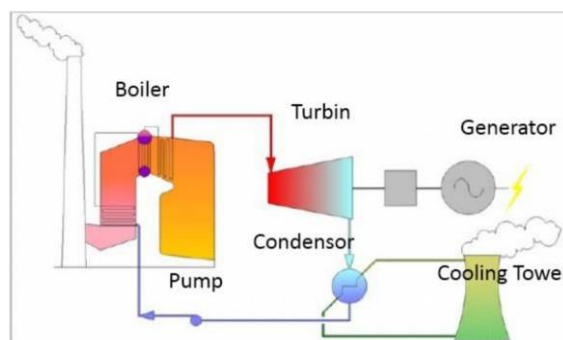


Figure 2. Biomias [9]

There are two methods of how biomass power plants generate electricity. The first way is to burn solid biomass directly so that the boiler produces steam. The second way is to carry out fermentation, or it can be called anaerobic digestion, which will produce biogas with methane and carbon dioxide, and other gases that can be used as fuel. This utilization can help with electricity problems and directly save the environment from damage caused by waste that is not empowered, especially organic waste.

3.3 Electricity from a speed bump

At the Universitas Sumatera Utara, a technology for converting mechanical energy into electricity is developed in the form of bumps used to charge cellphone batteries that produce up to 100 watts of power (See Figure 3).



Figure 3. Speed bump from USU

Resource from greencampus.usu.ac.id

The way it works is to use a speed bump, and then the car will pass, and then there is a pressure that produces kinetic energy. Then it will be converted into electricity and then stored.

4. Conclusion

There are still many potential sources of electricity that can be explored to create new and renewable energy. With this research, it is hoped that new renewable energy can be an alternative in overcoming existing conventional energy. It is hoped that universities can also apply it. the use of renewable energy and inspiring new ideas in the community. The supporting factor for the development of renewable energy is the campus's support in accordance with applicable regulations. Students' lack of knowledge about the advantages of renewable energy in the present and the future is a barrier to its development. Several factors support the development of renewable energy, namely government support in the form of laws, presidential regulations, ministerial regulations and regional regulations on energy, the existence of an APBN for the development of renewable energy, and abundant natural resources.

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