Application of long-term renewable energy technology for nature balance

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Abstract. The purpose of this study is to identify the development of renewable energy technologies in the world, especially Indonesia for the future. The method used in this study is a descriptive method, namely by presenting a complete picture of the situation associated with seeing the developments that have been applied. The result of this study is to find out the extent of developments in the clean energy and renewable energy sectors, as well as the importance of the environment and natural balance in aspects. This research was conducted by discussing the development of technology that is applied as a producer of clean energy that does not have a bad impact on the surrounding environment.

1. Introduction
Christopher Flavin and Molly Hull Aeck explained that the Renewable Energy technology project in many developing countries has contributed to poverty lessening by providing the energy needed. Renewable energy technology can also contribute indirectly to reducing poverty by providing energy to meet educational needs by providing electricity for schools [1]. IRENA explained that globally, there are an estimated 7.7 million jobs related to the renewable energy industry, the utilization of energy with sunlight into the most extensive renewable energy [2]. Climate change and global warming concerns, coupled with high oil prices, are becoming the world's awareness of the importance of renewable energy. Support from government institutions must be realized immediately to increase the application of more intensive renewable energy [3].

From the results of the REN21 international summit held in Paris, France explained that Worldwide investment in renewable technology reaches more than US $ 286 billion in 2015, countries like China and the United States are the countries with the largest investment in the application of wind, water, solar and biofuels [4]. The International Energy Agency explained that renewable energy resources are spread over a large geographical area, in contrast to other energy sources which are on average only in a number of countries. The rapid spread of renewable energy and environmentally friendly energy that efficiently produces significant energy storage, constrains climate change noise, and is beneficial for the economy [5]. Renewable energy sources obtained from sunlight, both directly and indirectly, such as water and wind, are expected to be able to supply energy for human needs for another 1 billion years, where it is predicted that the heat generated by the sun is the cause of rising temperatures is on earth [6].
Dudley explained that the use of energy that cannot be renewed excessively can cause an energy crisis. Energy is an important component for human survival because almost all activities of human life depend heavily on the availability of sufficient energy. Now and in the next few years, humans will still depend on fossil energy sources because this fossil energy source is capable of meeting human energy needs on a large scale [7]. While in Indonesia, according to kumara NS, the use of wind and sunlight energy for electricity generation has actually been done since quite a long time, since the early 80's, but the application is still limited to small power systems or better known as Solar Home System (SHS). The SHS system usually has a capacity between 25-50 Watts so that its ability to supply electricity loads is very limited. Generally, this system is used by rural communities that have not been reached by the National Electricity Company (PLN) [8].

Solar Spectral Irradiance Explains there are still other problems in the variability and distribution of renewable energy in nature, except geothermal energy which is generally concentrated in a particular area but is in an extreme location. Energy from the wind is one that is very difficult to focus on, because it requires a large turbine to collect as much wind that will produce electricity [9]. The method of utilizing wind, water, solar and geothermal energy depends on the location and characteristics of the respective resources so that the design of the turbine that is designed can be different. The use of solar energy can be applied in various ways, but to get a lot of energy requires an area with a large area. As an example of comparison with the conditions of testing standards in the United States, the energy received by 1 m2 of solar cells that have 20% efficiency will produce 200 watts. The standard conditions of the test in question are air temperature of 20°C and irradiance of 1000 W / m2 [10].

The purpose of this study is to avoid global warming, global efforts are needed to reduce the level of greenhouse gas emissions as soon as possible. This can be achieved by reducing the use of fossil fuels and preventing deforestation and Reforestation. Other renewable energy technologies are still under development, and include cellulose ethanol, geothermal, hot-dry-rock, and marine energy.

2. Experimental method
This study uses descriptive methods to present a complete picture of the situation involved by looking at the developments that have been implemented, as well as knowing how important the use of renewable energy for people's lives in the future, and the role given of green energy for the balance of nature, environment and human population which is increasing while the energy used is now increasingly alarming. As unlimited energy, sunlight, water, wind and geothermal energy can be used as future energy. With the availability of increasingly sophisticated technology, it may be developed and used as a means of producing energy in the future, so that it can meet the electricity needs in various parts of the world for the long term. This data is reinforced by interviews about geothermal implementation in Pangalengan, West Java. The interview was conducted on March 27, 2019 against 10 people managing the Wayang Windu PLTP.

3. Results and discussion
The transfer of dirty energy into clean energy is being developed in various countries, especially in Indonesia. In order to meet the electricity supply in the future, technology experts are working with various groups to build and develop clean energy and no longer rely on fossil energy because it is predicted to run out in the next few decades. There are several elements that can be utilized in the application of this energy, namely, wind, sunlight and geothermal. Renewable energy like plants hydroelectric and geothermal electricity has the advantage of being an option for greenhouse gas mitigation. Renewable energy can generate electricity without burning without the use of fossil energy. Hydroelectric power generation can be said to be free of greenhouse gas emissions, while geothermal power plants produce only one-sixth of greenhouse gas emissions generated from the use of natural gas for electricity generation.

This aspect is of course beneficial to the natural environment around because environmental damage resulting from the use of clean energy is almost zero percent, and plays a role in reducing electricity bills in an area both in cities and in rural areas.
Figure 1 explains the use of renewable energy that can be utilized by Indonesian people is energy from sunlight, because the climate in Indonesia can be illuminated by sunlight every day. This use can be applied with solar panel media as a device consisting of solar cells that convert light into electricity. Solar panels do not emit harmful greenhouse gas emissions such as burning fossil fuels, so the use of solar panels does not contribute to the effects of climate change. By using solar panels, we can get clean energy from the most abundant energy sources on the planet, the sun. The use of solar panels in Indonesia is still low because the cost factor is not cheap. This solar panel can be applied to additional household electricity needs so that the electricity bill is not so large, that is by installing solar panels on the roofs of houses, then the electricity supply produced will be accommodated in energy storage and can be used for needs.

Figure 2 explains that wind power in the Indonesian region can be used as a wind power plants, because the contour areas in Indonesia which are almost all islands are flanked by beaches and hills, this becomes Indonesia as a path of wind that moves every day. The use of wind as a renewable energy is considered very effective, because in many European countries it has been widely applied and the results can be very significant. Wind power can be utilized with wind turbine technology as a tool to make wind into
electrical energy. The use of this wind turbine is still very low in Indonesia because it can only be used by people in coastal areas and hills. If the government is serious about building a turbine with a fairly large scale, it might be able to increase the need for electricity supply that can be used in areas that have not been electrified. The technology of this turbine is very environmentally friendly because it does not produce carbon dioxide exhaust gas and does not damage the surrounding air.

![Geothermal turbine](image1)

Source: (Gretar Ívarsson, The Nesjavellir Geothermal Power Plant in Pingvellir, Iceland)

**Figure 3. Geothermal turbine.**

Figure 3 explains Geothermal energy is the use of heat inside the earth into electrical energy that can be used to meet electricity supply in a country. Indonesia is the third largest producer of geothermal energy after the United States and the Philippines in the first and second positions. Indonesia produces more than 1,197 MW and is quite significant. Indonesia is truly endowed with extraordinary natural potential. The geothermal contained in its earth's stomach is a form of energy-efficient natural engineering so that no artificial engineering variations are needed to explore the potential energy. The area surrounded by the most active mountainous mountains in the world or nicknamed the Ring of Fire makes Indonesia have a long magma path, this causes the soil in the earth's stomach to become hotter and can be used as heat energy. the investment needed is much cheaper compared to other countries. With the same investment range, the energy produced by geothermal & Indonesia is 10 times greater than that of other countries.

![Geothermal sketch](image2)

Source: (The Geothermal Sketch //google.com)

**Figure 4. Geothermal sketch.**
Figure 4 explains that Geothermal energy is a source of energy that is relatively environmentally friendly because it comes from heat in the earth. Water pumped into the earth by humans or natural causes (rain) is collected to the earth's surface in the form of steam, which can be used to drive turbines to produce electricity. Exploration costs and also the capital costs of geothermal power plants are higher than other power plants that use fossil fuels. However, after starting operations, the production costs are low compared to fossil fuel power plants.

Application of Long-term Renewable Energy Technology can save energy so that in the future, humans will not depend on non-renewable energy [11]. The use of technology in the use of renewable energy in various countries in the world is a means to overcome human needs for energy supply in the future. Solar panels, wind turbines and geothermal turbines are tools for the use of alternative energy that does not damage the environment. The use of solar panel equipment and wind turbines can be a means to be applied at home as alternative energy, and can also save on conventional electricity bills.

4. Conclusion

Energy is a form of power that is produced or possessed by an object. Energy is an important component for human survival because almost all activities of human life are very dependent on the availability of sufficient energy. To avoid an energy crisis due to limited energy in nature requires energy Renewable energy is renewable energy which is derived from 7 sustainable natural processes7, such as solar power, wind power, biological processes, and geothermal water. With the presence of renewable energy, it is expected that human resources will not be reduced. Renewable energy technology is still under development to be used as a fossil energy device that is currently still used. But this is a breakthrough in the future so that the environment and the natural environment are not damaged due to excessive use of fossil energy. This is a long-term solution to be implemented in various countries in the world. The frightening issue of climate change for all people in the world is the reason why green technology is one of them is the application of renewable energy technology.

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