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The Indonesian State's Transitional Efforts in Developing Renewable Energy

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ABSTRACT

In a country, energy plays an important role in everyday life. Energy is defined as the ability to do work. All objects that can produce energy are called energy sources. Energy sources themselves are divided into two, namely non-renewable energy and renewable energy. Renewable energy is a source obtained from the earth's natural resources which are unlimited or will not run out such as wind, sun and others. The use of renewable energy sources has both positive and negative impacts on the surrounding environment. It is not surprising that renewable energy sources have many positive impacts, including reducing pollution by using environmentally friendly fuel or reducing greenhouse gas emissions, maintaining public health.

Keywords: Energy, Renewable Energy, Impact

INTRODUCTION

Energy is the ability to do work. Energy is also a quantity that can be changed from one form to another. Like on a motorbike, chemical energy changes into mechanical and thermal energy. Energy currently has a very important role in everyday human life. Energy is a support for national economic activities and is used as a tool to achieve social, economic and environmental goals. In a situation like this, fossil energy sources are certainly becoming increasingly depleted, in today's world there is a shift from the use of non-renewable energy sources to renewable energy sources. The potential for renewable energy, such as biomass, geothermal energy, solar energy, water energy and wind energy, has not yet been widely exploited, even though the capacity of this renewable energy is very large, especially in Indonesia. Of the many renewable energy sources, as explained above, the use of energy through solar cells is the alternative with the most potential to be implemented in Indonesia. Renewable energy is energy that comes from renewable energy sources. The source of renewable energy itself is an energy source that can be used without time limitations and will never run out because this renewable energy can be recovered in a relatively short period of time. The Indonesian state's transitional efforts to develop renewable energy are not only seen in terms of income, but what is known as a development process, but on the other hand there are quite dynamic factors including: social, which is centered on humans and society. In some areas where there is renewable energy development, there are factors that can be a reference for the success of renewable energy development and could also be the main factor in the failure of the process. Therefore, the best alternative is to utilize renewable energy found in the local environment using a small and regional energy system.

Types of renewable energy such as solar energy, wind energy, water energy, biomass energy (divided into 4): organic waste solid fuel or decomposing in nature, solid waste fuel (inorganic waste). Gas fuel and biofuel are in liquid form. Likewise, renewable energy certainly has its own advantages and disadvantages. The advantages are that it is easily and abundantly available, it never runs out, it is environmentally friendly, the energy source can be used freely with appropriate technological investment, and it is independent and does not require a lot of maintenance. The disadvantages are that it requires large initial costs, renewable energy is dependent on weather conditions, additional energy produced by renewable energy must be stored, and there is a lack of experience for renewable energy in technologies that are still developing.

With the emergence of renewable energy in Indonesia, there are certainly many reasons why renewable energy is an option, including because it is relatively inexpensive, neutral and most renewable energy does not cause pollution. Meeting the energy needs of a country in this modern era is very important in supporting a country's economic activities. Excessive use of energy, where the energy comes from nature, for example oil, gas, coal and others, can have negative effects on the environment. Renewable energy has a positive impact on the environment, including reducing pollution, producing fewer greenhouse gas emissions, maintaining the health of citizens, reducing environmental pollution which causes flooding and so on.

METHOD

This research method is included in the type of descriptive approach which seeks to develop and interpret objects according to what they are. This research is also often called non-experimental, because in this research the research does not control and manipulate research variables. Apart from that, descriptive research is also research, where data is collected to answer research questions related to current conditions and events.

RESULTS AND DISCUSSION

Renewable energy

Renewable energy is energy that comes from renewable energy sources. The source of renewable energy itself is an energy source that can be used without time limitations and will never run out because this renewable energy can be recovered in a relatively short period of time. Renewable energy comes from natural factors that are available on earth in large quantities, for example: sun, wind, plants, rivers, and so on. Renewable energy itself is a very environmentally friendly energy source, because this renewable energy does not create pollution to the environment and is not included in the causes of climate change and global warming. There are several types of renewable energy, but not all of them can be used in remote and rural areas. Solar power, wind power, hydropower and biomass are the most equivalent technologies when used to provide energy sources in remote areas and rural areas. Meanwhile, other renewable energies such as geothermal energy and tidal energy are technologies that cannot be used everywhere.(Azhar & Satriawan, 2018)

Indonesia is a country that has enormous potential in creating renewable energy sources because of the astronomical influence and geographical location of Indonesia itself. Indonesia is located on the equator which causes Indonesia to have a tropical climate, and the majority of all areas in Indonesia are certainly illuminated by the hot sun. The Indonesian state's transitional efforts to develop renewable energy are not only seen in terms of income, but what is known as a development process, but on the other hand there are quite dynamic factors including: social, which is centered on humans and society. In some areas where there is renewable energy development, there are factors that can be a reference for the success of renewable energy development and could also be the main factor in the failure of the process.

This can happen because the nature of renewable energy development which is the benchmark for local communities is inversely proportional to a centralized energy system. Indonesia has very diverse physical characteristics, especially in mountainous areas, oceans and rivers, which can be a challenge in itself to make this happen. Therefore, the best alternative is to utilize renewable energy found in the local environment using a small and regional energy system. Humans and society can be the determining factor because renewable energy is local in nature, meaning it converts the process of generating and distributing electricity as well as payment to local communities, which means from, by and for the community.(Letiana, 2016)

Types of Renewable Energy

1. Solar energy

Figure 1. Solar energy
https://www.duniasains.my.id/2020/08/panel-surya-sejarah-konsep-fitur-dan.html

Solar energy is the most powerful and largest energy source. Sunlight can be used for electricity generation, water heating, lighting, and various other industrial processes. Sunlight can also be converted into electrical energy using technology such as solar panels which are able to process heat energy into electrical energy. However, electrical energy through sunlight can occur depending on the weather conditions at that time.(Prastowo, 2007)

2. Wind Energy

Figure 2. Wind Energy
https://www.mldspot.com/trending/pembangkit-listrik-tenaga-angin-pertama-di-sulawesi-selatan

Wind energy is a movement that can occur if there is warm air and cold air. Wind energy itself has been used for centuries to provide impetus for ships sailing on the sea, even when crossing vast oceans. Apart from that, the wind that moves against the turbine will make the blades on the windmill spin.(Hasanah & Setiawan, 2022)

3. Water Energy

Figure 3. Water Energy
https://energycentral.com/c/tr/hydro-power-transmission-projects-can-help-meet-clean-energy-goals

Water energy is an example of renewable energy that utilizes energy such as potential energy (the energy possessed by an object due to the position or position of the object) and kinetic energy (the energy possessed by a moving object). A water that flows from upstream to downstream. As is well known, the sun can cause the water in lakes and oceans to evaporate upwards to form clouds. Then the water that has evaporated and formed clouds will cause rain or snow, then the water will flow into rivers and the water in the river will return to the sea. In general, dams built across rivers are used to store water in lakes. Next, the water will flow through the holes in the dam which are useful for driving the propellers or turbines to produce electrical energy.(T. Haryono, 2015)

4. Biomass Energy

Figure 4. Biomass Energy
https://meioambientetecnico.blogspot.com/2012/02/biomassa.html

Biomass energy is renewable energy which refers to biological materials. Materials such as biologicals usually come from organisms that have recently died or are still alive. Biomass can also be produced by the photosynthesis process in the form of products or waste. Examples of biomass materials are trees, sweet potatoes, grass, waste, livestock manure, and plants. Biomass can also be used as fuel.(Kong, 2013)

There are four types of biomass:

1. Solid fuel is organic waste or decomposes in nature

Wood and agricultural waste can be burned and used to produce steam and electricity. A lot of electrical energy is used by industry to produce waste that can be used to power their own machines (for example, furniture manufacturers).(Taufiqurrohman et al., 2022)

2. Solid waste fuel (inorganic waste)

Not all waste is organic, but some is inorganic, such as plastic. Power plants that utilize waste to produce energy are called waste power plants. The power plant works in the same way as a coal-fired power plant, except that the fuel is not a fossil fuel but rather burnt waste.(Lubis, 2007)

3. Gas fuel

Garbage contained in landfills will rot and can produce methane gas. If the methane gas that occurs as a result of waste decomposition is collected, it can be directly used to be burned which can then produce heat for practical use or be used in power plants to produce electricity. Methane can also be produced by using animal and human waste in a controlled manner. A biodigester is an airtight container in which waste or sewage is fermented in conditions without oxygen using a process called aerobic digestion (a waste processing process designed to reduce the volume of waste sludge and make it suitable for further use) to produce gas that contains a lot of methane. This gas can be used for cooking, heating and also generating electricity.

Gasification is a process to produce gas that can be used as fuel in power plants. In biomass gasification, low-cost biomass, such as coal or agricultural waste is partially burned and the resulting synthetic gas is then collected and used for heating and electricity generation. By using further techniques, synthetic gas can be converted into synthetic diesel oil or fuel from high quality biological sources (biofuel), which is equivalent to diesel oil and used to drive conventional diesel engines.(Adjikri, 2017)

4. Biofuels are in liquid form

Biofuel is fuel for motor vehicles or engines. This fuel can be used as an addition or replacement for conventional fuel for engines. Bioethanol is alcohol made by fermenting the sugar contained in food plants (for example: sugar cane, corn and cassava), and is used as an additive to gasoline. Biodiesel is made from vegetable oil (for example: palm oil, curcas, coconut oil, jatropha, waste vegetable oil / WVO, or soybean oil). Biodiesel can be used alone or as an addition to diesel engines without modifying an engine.(Setyono & Kiono, 2021)

Advantages and Disadvantages of Renewable Energy

Utilizing renewable energy does have advantages and disadvantages. In the New and Renewable Energy Textboo kSilitonga & Ibrahim, (2020:7)

Advantages of Renewable Energy;

1. Available easily and abundantly

Renewable energy is available in abundance and is an energy source that comes from nature and can be continuously renewed and is available in quite large quantities. In Indonesia itself, there are several abundant renewable energy sources such as water energy, solar energy, biomass energy, wind energy, and the development of PLTSa.

2. Will Never Run Out

Renewable energy will never run out because it is formed from sustainable natural processes. Renewable energy comes from natural resources that are unlimited and will never run out. Examples of renewable energy sources include sunlight, wind and water. Renewable energy sources are also used to replace energy sources that will run out, such as oil, gas and coal. The use of renewable energy helps reduce dependence on fossil energy sources which are harmful to the environment. In order to overcome the exhaustion of energy sources, it is important to explore renewable energy sources and develop the necessary technologies.

3. Environmentally Friendly, In Other Words There is No Waste or Causes Pollution

This use of renewable energy helps reduce carbon dioxide and greenhouse gas emissions, which is positive for the environment. Awareness and use of renewable energy will help reduce the negative impact of fossil energy sources and maintain environmental balance.

4. Energy sources can be utilized for free with appropriate technological investment

Does not require much maintenance and reduces operating costs, helps improve the economy and creates extensive employment opportunities;

5. Independent (No Need to Import Fossil Fuels)

Including in the long term and some technologies can be used in remote places.

Renewable Energy Shortage (Loss);

1. Requires Large Initial Costs

Because creating or creating a renewable energy source will certainly require very large initial costs to achieve the goal of renewable energy itself.

2. Renewable Energy Depends on Weather Conditions

The meaning of depending on weather conditions, for example, is: not always can solar panels work, because the sun itself only appears from morning to late afternoon and the sun does not always shine every day. Likewise other renewable energies

3. Additional Energy Produced by Renewable Energy Must Be Stored

Because the infrastructure is not yet complete, unused energy can be immediately used, which can be used as reserves in other countries in the form of access to the electricity grid.

4. Lack of Renewable Energy Experience in a Still Developing Technology

Indonesia itself still lacks experience in creating renewable energy and lacks adequate technology.

Impact of Renewable Energy on the Surrounding Environment

Meeting the energy needs of a country in this modern era is very important in supporting a country's economic activities. Excessive use of energy, where the energy comes from nature, for example oil, gas, coal and others, can have negative effects on the environment. This will later become a common concern, because economic activities in Indonesia which tend to use energy that is not environmentally

friendly in the future will definitely have quite a big impact on environmental damage, of course there are several other factors that arise such as environmental damage which can be detrimental to the country and also such as public health factors, natural disasters and so on(Ula & Affandi, 2019).

With the emergence of renewable energy in Indonesia, there are certainly many reasons why renewable energy is an option, including because it is relatively inexpensive, neutral and most renewable energy does not cause pollution.(Silitonga & Ibrahim, 2020). In Renewable Energy PLTSa (Trash Power Plant) which is currently being developed in Indonesia and can have an impact on the surrounding environment, including reducing environmental problems due to waste. The construction of PLTSa in terms of providing electrical energy for the community and in terms of reducing environmental problems due to waste, it is hoped that the construction of PLTSa will be able to contribute to meeting the electricity needs of the community.(Qodriyatun, 2021). Using environmentally friendly renewable energy sources also means saving the environment from various negative environmental impacts such as fuel(Lubis, 2007).

Renewable energy has a positive impact on the environment, including reducing pollution, producing less greenhouse gas emissions, maintaining the health of citizens, reducing environmental pollution which causes flooding and so on. This must be considered because renewable energy can produce electricity and renewable energy is very environmentally friendly energy.

CONCLUSION

Energy is the ability to do work. Energy is a support for national economic activities and is used as a tool to achieve social, economic and environmental goals. Renewable energy is a natural resource obtained from sources that can be renewed naturally, such as sunlight, wind, water and biomass. The source of renewable energy itself is an energy source that can be used without time limitations and will never run out because this renewable energy can be recovered in a relatively short period of time. The advantages of renewable energy sources are that they are available easily and abundantly, they never run out, are environmentally friendly, energy sources that can be utilized freely with appropriate technological investment, and are independent (no need for fossil fuels). Meanwhile, the disadvantages are that it requires quite large initial costs, renewable energy depends on weather conditions, additional energy produced by renewable energy must be stored, and there is a lack of experience with renewable energy in technologies that are still developing. The impact of renewable energy on the environment is low greenhouse gas emissions, sustainable land use, minimal air and water pollution, and so on.

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