

Renewable Energy As A Green Economy Stimulus In Indonesia

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Abstract : The world's population is increasing every year, which results in an increased need for energy. It is known that the largest energy source used today is fossil energy. Fossil energy sources are also depleting and have negative impacts such as greenhouse gas emissions, so alternative solutions are needed to meet energy needs. The Green Economy concept places a focus on environmental sustainability and reducing negative impacts on the environment. There are many sectors that help promote the green economy, including the renewable energy sector, which consists of geothermal, wind, bioenergy, sunlight, water flows, and waterfalls, as well as the movement and temperature differences of the sea layers. The research objective is to find out the potential of renewable energy as a green economy stimulus in Indonesia and how the government can maximize the benefits of the existing potential. This study uses a qualitative method, namely a literature review (library research). The results of the study concluded that the utilization potential of renewable energy in Indonesia is still very low, namely only 0.3%, or around 11.6 GW, of the total 3,643 GW that can be utilized. For this reason, there are still many opportunities for a green economy to be achieved by utilizing renewable energy. The Indonesian government has taken important steps to encourage investment and the development of renewable energy through various policies. Of course, all of this also requires synergy from the government, the private sector, and the community so that Indonesia's target of becoming a "green economy".

Keywords : Renewable Energi, Stimulus, Green Economy, Indonesia

1. Introduction

Indonesia's population currently reaches more than 275 million people (BPS, 2022) and is expected to continue to increase in the future. Large population growth has an impact on increasing demand for various resources, including energy. Fossil fuels, such as oil, natural gas, and coal, have been the backbone of Indonesia's energy sector for decades. However, the excessive use of fossil

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energy has caused negative impacts on the environment, such as increased greenhouse gas emissions and adverse climate change. In addition, one of the increasingly obvious challenges is the depletion of fossil energy reserves in Indonesia. Indonesia has been dependent on imports of fossil energy to meet its domestic needs, and dwindling domestic reserves mean that we need to look for energy alternatives that are more sustainable and environmentally friendly.

The "Green Economy offers the concept of a sustainable economic climate for the welfare of society for present and future generations (Anwar, 2022). The United Nations Environment Program (UNEP) states that the "green economy" is an economic activity that is low in carbon, saves natural resources, is socially just, and does not rely on fossil fuels. UNEP divides the scope of the green economy into eleven sectors, including agriculture, buildings, cities, energy, fisheries, forests, manufacturing, tourism, transportation, waste, and water.



Sumber: UNEP, 2010 dalam Yusuf, 2010.

Figur 1. Green Economy Sector

Each sector has an important role in achieving sustainable and environmentally friendly economic development. In this case, the energy sector focuses on the transition from fossil energy resources to renewable energy sources such as solar energy, wind energy, and bioenergy. Indonesia is a country with the largest energy consumption in Southeast Asia, which is dominated by fossil energy (Afriyanti et al., 2022) It is known that the use of fossil energy in a sustainable manner can lead to reduced energy reserves while demand continues to increase. This situation has the potential to become a threat to Indonesia's economic growth. In addition, the excessive use of fossil fuels also causes an increase in carbon dioxide (CO₂) emissions, which contribute to adverse environmental impacts such as greenhouse gas emissions and global warming.

According to the Director General of New, Renewable Energy, and Energy Conversion (EBTKE) of the Ministry of Energy and Mineral Resources in 2018, fossil energy reserves are decreasing. Data shows that current coal reserves range from 7.3 to 8.3 billion metric tons, which are predicted to be exhausted by 2026. Meanwhile, oil stocks are currently at 3.7 billion barrels and are predicted to be exhausted by 2028. Material reserves of gas are currently at 151.33 trillion cubic feet (TCF) and are expected to be exhausted by 2067. In 2021, strong structural changes in the energy market will continue to drive the shift to a lower-carbon economy. This year, the target of the energy mix for new and renewable energy (EBT) is 14.5%, with a target of 31% in 2030 (Syamsuddin et al., 2023).

This is increasingly worrying; therefore, an alternative strategy is needed in the energy sector so that the need for sustainable and environmentally friendly energy to achieve a green economy in the future can be met. By looking at the problems above, the researchers tried to raise this problem to be studied in a research article entitled "Renewable Energy as a Stimulus for the Green Economy in Indonesia."

2. Research Method

The method used in this study is qualitative research using a literature review (library research). A literature review involves searching for and collecting information from various relevant sources, including books, scientific journals, and other academic publications. Through a literature review, researchers can gain a comprehensive understanding of the topic being researched and gain insight from previous research that has been conducted by experts in the field.

3. Results And Discussions

The development of renewable energy in Indonesia is currently the main focus of the government, both at the national and international levels. One of the steps taken by the government of Indonesia to anticipate climate change is to join the Paris Agreement as a form of global commitment in efforts to combat climate change. In an effort to accelerate economic recovery after the COVID-19 pandemic and encourage sustainable economic development, the Government of Indonesia has adopted a green economy plan," or Green Economy," as one of the main strategies for economic transformation in the medium and long term

3.1. Energi Economics

Economics in general can be interpreted as a branch of social science that studies human activities related to the production, distribution, and consumption of goods or services. According to Abraham Maslow, economics is a scientific discipline that aims to solve the problems of human life by optimizing the utilization of all available economic resources. This is done through the application of theories and principles in an economic system that is considered efficient and effective. According to Robbins, "economics" is a study that analyzes human behavior in relation to achieving goals by considering the availability of existing resources (Tindangen et al., 2020).

Energy is a power that has the potential to carry out activities or work, such as producing heat, emitting light, moving objects mechanically, inducing chemical reactions, and creating electromagnetic fields (Undang-Undang No 30, 2007). Energy is the ability to perform actions or work. The origin of the word "energy" comes from the Greek, namely "ergon," which means work, where in every activity we carry out, both consciously and unconsciously, we always utilize energy (Sidik & Harmoko, 2022).

According to Yusgiantoro energy economics is a field of study that involves an understanding of how people or groups in society make decisions, select, use, and manage limited resources effectively and efficiently (Yusgiantoro & Yusgiantoro, 2018). The aim is to meet a wide range of use options in the production of goods and services and distribution for consumption now or in the future.

Energy economics is a branch of economics whose focus lies on energy as the main driver of economic activity. The study of energy economics is used as an analytical tool to understand how consumers meet energy needs, how producers provide energy, the investment and costs involved,

market structure, and the government's role in the energy market. Its significance lies in the fact that energy is a resource and commodity that is very important, strategic, and has far-reaching implications. In this context, not only the economic aspects are relevant, but also the social, economic, and political dimensions that must be considered (Rakhmanto, 2021).

So it can be concluded that energy economics is a branch of economics that focuses on energy as the main driver of economic activity. The goal of the energy economy is to optimize the efficient and effective use of limited energy resources to meet current and future consumption needs.

3.2. Renewable Energi

Law Number 30 of 2007 states that "renewable energy" is energy that comes from renewable energy sources. Renewable energy sources are energy sources that are produced from sustainable energy resources if managed properly, including geothermal, wind, bioenergy, sunlight, water flows, and waterfalls, as well as the movement and temperature differences of the sea layers.

Renewable energy, according to the International Energy Agency (IEA), can be explained as an energy source that can be continuously renewed through natural processes. Examples include energy produced directly or indirectly from sunlight or geothermal energy. The IEA classifies renewable energy as solar energy, wind energy, biomass, geothermal energy, hydro energy, ocean energy, biofuels, and hydrogen.

So it can be concluded that renewable energy is a type of energy that comes from renewable energy sources that can be renewed continuously through natural processes.

3.3. Green Economy

The "green economy is a concept that aims to improve people's welfare without presenting the risk of environmental damage (Antasari, 2019). This shows that "green economy" refers to an idea related to economic practices that focus on environmental sustainability and reducing negative impacts on the environment as part of efforts to improve the social and economic welfare of society.

This "green economy" can also be interpreted as an economy that produces low or no carbon dioxide emissions to the environment, saves natural resources, and is socially just (Kementerian Energi dan Sumber Daya Mineral, 2020). This means that a "green economy" is carried out to reduce or even eliminate fossil fuels and industrial practices that produce carbon emissions, use natural resources efficiently and sustainably with wise use of energy, water, and raw materials, and reduce waste. The green economy also aims to achieve social justice, improve people's living conditions, and reduce social inequality.

The United Nations Conference on Trade and Development (UNCTAD) states that a green economy can be defined as an economic system that focuses on increasing human well-being and reducing inequality while avoiding significant environmental risks and ecological scarcities for future generations. Meanwhile, the United Nations Environment Program (UNEP) defines a green economy as an economic system that involves the distribution, production, and consumption of goods and services with the aim of increasing long-term societal well-being while avoiding significant environmental risks and ecological scarcities for future generations (Direktorat Lingkungan Hidup, 2013). This shows that a green economy can improve life and human well-being in general, reduce social and economic disparities between individuals and groups in society, minimize risks and negative impacts on the environment, and emphasize the importance of acting responsibly towards future generations.

Sustainable development contains three important aspects: economic, environmental, and social. The concept of "green economy" is defined as an approach that includes low-carbon, resource-efficient, and socially inclusive aspects. In a green economy, employment and income growth are driven by investments from both the public and private sectors in economic activities, infrastructure, and assets aimed at reducing carbon emissions and pollution, increasing energy efficiency and resource use, and preventing loss of biodiversity and benefits. Economies must address the challenges of economies of scale as a whole by managing material and energy use.

The concept of a "green economy" has significant utility when it comes to engaging policymakers, economists, and business actors in critical discussions with other stakeholders. The aim is to compare the various development options available. In this comparison, it is important to consider economic criteria along with social, political, cultural, and ecological criteria that support sustainability (Anwar, 2022). The green economy concept encourages investment to reduce carbon emissions, increase energy efficiency, and protect biodiversity. To succeed, it requires holistic handling of economies of scale and the active involvement of policymakers, economists, and business actors in critical dialogue with other stakeholders, taking into account sustainable economic, social, political, cultural, and ecological criteria.

Economic growth is a process that aims to increase national income in the hope of increasing the welfare of society as a whole (Arkas, 2021). According to Pearce, Markandya, and Barbier, who wrote in their book entitled "Blueprint for a Green Economy". A green economy is defined as an economic system that involves the production, distribution, and consumption of goods and services with the aim of increasing human well-being in the long term without presenting significant environmental risks and ecological scarcities for future generations. Even though there is positive and stable economic growth, the positive impact of this growth has not been felt by the community either in the present or in the future (Anwar, 2022). Measuring the impact of economic growth on society in the future is important. According to the Brundtland Report, economic growth may become a significant burden on the earth's environment in the future (Hajian & Kashani, 2021). The idea of "green growth" is the right approach because it focuses on increasing economic activity while paying attention to the efficient use of natural resources and reducing the negative impact of economic activity on the environment.

The intense interaction between the economy and the environment currently occurs when society considers the damage caused by productive activities to the natural environment, such as pollution of water resources, air, soil, and biodiversity, which in turn affects social dynamics. The economy seeks to achieve development that is low-carbon, efficient in the use of resources, and socially inclusive. The concept of a green economy relies on three main strategies: reducing carbon emissions, increasing energy efficiency and the use of natural resources, and protecting biodiversity and ecosystem services. Implementation of this strategy requires investment support from the public and private sectors, as well as policy and regulatory reforms. Therefore, it is important to maintain, strengthen, and restore natural capital as an economic asset and for public benefit (Anwar, 2022)

It can be concluded that a "green economy" is an idea that aims to improve people's welfare without risking damage to the environment. This Green Economy concept involves economic practices that focus on environmental sustainability and reducing negative impacts on the environment. This is done as part of efforts to improve the social and economic welfare of the community.

3.4. Renewable Energy Potential in Indonesia

The reduced production of fossil energy, especially petroleum, as well as global commitments to reduce greenhouse gas emissions have encouraged the government to continue to increase the role of new and renewable energy as part of efforts to maintain energy security and independence. In accordance with Government Regulation (PP) Number 79 of 2014 concerning National Energy Policy, there is a target to use a mixture of new and renewable energy in 2025 of at least 23%, and in 2050 of 31%. Indonesia has significant potential for new and renewable energy sources, which is sufficient to achieve the target of using the primary energy mix.

Table 1. Renewable Energy Potential

EBT Commodities	Total Potential 2021 (GW)	Power Generation Capacity (GW)	% Utilization
Ocean	17,9	-	-
Geothermal	23,9	2,3	9,6 %
Bioenergy	56,9	2,3	4,0 %
Bayu	154,9	0,2	0,1 %
Hydro	95,0	6,6	7,0 %
Sun	3.294,0	0,2	0,01 %
Total	3.643,0	11,6	0,3 %

Source : OEI, 2022

Even though the total potential of renewable energy for power generation reaches 3,643 GW, its current utilization is still very low, namely only 0.3%, or around 11.6 GW. With abundant resources to be exploited if accompanied by increased awareness of sustainability and the need to reduce greenhouse gas emissions, there are great opportunities to develop and increase the use of renewable energy. The current low utilization of renewable energy represents a great opportunity for diversification of energy sources in the electricity sector. By making use of renewable energy more broadly, we can reduce dependence on fossil energy and increase the sustainability of the energy sector.

In a global context, the demand for renewable energy continues to increase in line with efforts to mitigate climate change. This opens wide market opportunities for development and investment in renewable energy, including in the power generation sector. Companies and countries that are able to take advantage of the potential of renewable energy can gain economic benefits and create new jobs. In addition, technological innovations that are more efficient and affordable can be developed, thus enabling the use of renewable energy at a more competitive cost and increasing its competitiveness compared to fossil energy.

There are several factors that cause the lack of utilization of new renewable energy (EBT) in the electricity sector. One of the main factors is the production price of EBT-based power plants, which is still relatively high, making it difficult to compete with fossil power plants, especially those that use coal. In addition, the lack of support from the domestic industry related to renewable energy generator components is also an obstacle to the development of EBT. Furthermore, difficulties in

obtaining funding with low interest rates are also a factor slowing down the development of renewable energy. All of these factors contribute to the low utilization rate of existing renewable energy potential (Dewan Energi Nasional., 2019)

3.5. Renewable Energy as a Green Economy Stimulus

The government is showing a serious commitment to the renewable energy industry by adopting a green economy as the main strategy for medium- and long-term economic transformation. This step becomes even more important during a pandemic, where transformation is the key to accelerating economic recovery and promoting inclusive and sustainable development growth. Renewable energy has become an important stimulus for a green economy and plays a role in promoting sustainable growth that focuses on being low-carbon and environmentally friendly. Renewable energy has great potential as a source of clean and sustainable energy. The application of renewable energy provides widespread economic benefits, thereby creating new job opportunities in the renewable energy sector, including the design, construction, installation, and maintenance of renewable energy infrastructure. This means there is potential for increased income for local people, which can help reduce unemployment rates. Renewable energy contributes to the diversification of energy sources and reduces dependence on limited fossil energy sources. This diversification can reduce energy supply risks and make the country more energy independent. In addition, renewable energy can often be produced locally, reducing dependence on energy imports and strengthening domestic economic sustainability.

The use of renewable energy can reduce greenhouse gas emissions and other negative impacts on the environment. Reducing the use of fossil fuels reduces air pollution and causes climate change. This translates to significant public health benefits by reducing the impact of diseases caused by air pollution and improving the overall quality of life. In addition, renewable energy can encourage innovation and the development of new technologies. In an effort to increase the efficiency and reliability of renewable energy sources, a lot of research and development has been carried out to improve renewable energy technology and infrastructure. This means opportunities to create jobs in the research and development sector as well as promote the growth of related industries.

Indonesia has abundant natural resources, including sunlight, wind, and a huge potential for hydroelectric energy. Making the most of renewable energy can help diversify energy and reduce dependence on imported fossil energy sources. This will increase the country's energy security and reduce the risk of fluctuations in global energy prices. The development of renewable energy can create new jobs in the energy sector. With increased investment in solar, wind, and hydroelectric power generation, there will be job opportunities for local people, both in infrastructure development and maintenance operations. This will contribute to alleviating unemployment and increasing the economic welfare of the people. In addition, the application of renewable energy can help reduce greenhouse gas emissions in Indonesia.

As a country with significant emission levels, switching to clean energy sources can help reduce the impact of climate change. The emission reduction is also in line with Indonesia's commitment to achieving emission reduction targets based on the Paris Agreement. The role of the government is also very much needed through the policies carried out, including by issuing Law Number 30 of 2007 concerning energy and the establishment of the National Energy Council, Law Number 21 of 2014 concerning geothermal energy, Law Number 30 of 2009 concerning electricity, and various other policies so that the potential for renewable energy can be maximized.

In an effort to improve the efficiency and reliability of renewable energy sources, research and the development of better technology are needed. This creates opportunities for the industrial and research sectors in Indonesia to contribute to the development of more efficient and affordable renewable energy technologies. Renewable energy can be an important stimulus for the green economy in Indonesia. By leveraging abundant natural resources, creating new jobs, reducing greenhouse gas emissions, and encouraging technological innovation, renewable energy can become a key pillar in Indonesia's economic transformation towards sustainability. In this case, cooperation between the government, the private sector, and the community is the key to encouraging the development and widespread use of renewable energy in Indonesia.

4. Conclusion

Renewable energy has great potential as a stimulus for the green economy in Indonesia. Renewable energy development can provide widespread economic benefits, create new jobs, reduce greenhouse gas emissions, and encourage technological innovation. In recent years, Indonesia has taken serious steps to adopt a green economy as the main strategy for medium- and long-term economic transformation. The application of renewable energy can help diversify energy sources, increase national energy security, and reduce the risk of fluctuations in global energy prices. In addition, switching to clean energy sources can help reduce the impact of climate change and improve people's quality of life.

To accelerate the development of renewable energy in Indonesia, strong collaboration between the government, the private sector, and the community is required. The government needs to continue to promote policies that support investment in renewable energy and provide incentives for developers and investors. In addition, there is a need to increase awareness and educate the public about the benefits of renewable energy and the need to reduce the use of fossil fuels. Investment in technology research and development should also be encouraged to increase the efficiency and reliability of renewable energy sources.

The government must also strengthen regulations that lead to the widespread use of renewable energy. This includes reducing administrative barriers to the licensing process for renewable energy projects and accelerating the land acquisition process for renewable energy infrastructure development. In this regard, collaboration with financial institutions and international institutions can assist in obtaining the necessary financial and technical support to develop the renewable energy sector.

In addition, there is a need for a strong campaign to increase public awareness and understanding of the benefits of renewable energy and the importance of participating in the transition to a green economy. Education about energy saving, the use of renewable technologies, and the individual's role in reducing carbon footprints should also be a focus in efforts to create an environmentally friendly culture.

Overall, the development of renewable energy as a green economy stimulus in Indonesia requires collaboration between the government, the private sector, and the community. With the right steps, Indonesia can achieve sustainable economic growth, reduce greenhouse gas emissions, create jobs, and improve environmental quality. It is important to continue to encourage and invest in the development of renewable energy as a step towards a greener and more sustainable future.

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