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NAVIGATING THE ENERGY TRANSITION: GREEN ECONOMY STRATEGIES IN THE FACE OF GLOBAL CLIMATE CHANGE CHALLENGES

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Abstract

Global climate change has become a serious challenge that drives the need to transition to a green economy as a solution to realising sustainable development. This article discusses strategies for navigating the energy transition through the adoption of a green economy, which includes the development of green technologies, investment in renewable energy infrastructure and policies that promote sustainable business practices. It also highlights key challenges, such as resistance from fossil fuel-based industries, the need for financial support and technology gaps between countries. With international collaboration and multi-stakeholder commitment, an effective and equitable energy transition can be realised. In conclusion, the green economy provides a profound and strategic approach to climate change mitigation while emphasising the importance of transforming the global energy system for long-term sustainability.
Keywords: Navigating, Energy Transition, Green Economy Strategy, Global Climate Change Challenges.

Introduction

Global climate change has become one of the biggest challenges faced by the world community in the 21st century. Increased greenhouse gas emissions due to human activities, such as burning fossil fuels, deforestation and environmentally unfriendly industrialisation, have triggered a significant increase in the Earth's temperature (International Energy Agency, 2022) . The impacts are already being felt, such as extreme weather, rising sea levels, and natural resource crises that threaten the sustainability of human life and existing ecosystems. A recent report by the Intergovernmental Panel on Climate Change (IPCC) suggests that without significant action to reduce carbon emissions, these consequences will worsen in the coming decades (McNeill, 2001) .

Impacts of Global Climate Change on Environment and Ecosystems Global climate change is causing great damage to the environment and ecosystems around the world. One of the impacts is an increase in the Earth's temperature that triggers extreme weather phenomena, such as heat waves, more violent storms, and heavy rains that cause flooding (IPCC, 2018) . In addition, rising temperatures also contribute to the melting of ice at the North and South Poles, leading to rising sea levels.

Such changes threaten the sustainability of many ecosystems, especially coastal areas that are prone to drowning and home to millions of people. Natural ecosystems such as coral reefs are also increasingly threatened by global warming, resulting in coral bleaching and a consequent decline in marine biodiversity (Stern, 2006) .

Impacts of Climate Change on Social and Economic Life
Beyond the environment, global climate change has a major impact on social and economic life. The availability of resources such as water and food is compromised, as extreme weather impacts agricultural production, resource distribution and people's access to basic needs. For example, more frequent droughts in some regions threaten crop production, while floods destroy infrastructure and incur very high recovery costs (McGlade & Ekins, 2015) . Economic losses from climate change can run into billions of dollars, especially for developing countries that are more vulnerable to natural disasters. In addition, climate change also triggers environmental migration, which is the movement of groups of people from affected areas to safer areas. This creates new social challenges, such as resource-related conflicts and economic inequality in migration destinations (Stern, 2006) .

In an effort to respond to these challenges, the transition to a green economy is now a major concern for many countries. Green economy refers to a development model that is oriented towards reducing carbon emissions, resource efficiency and social inclusion. One of the energy transition strategies in the green economy concept is the shift from reliance on fossil fuels to renewable energy, such as solar, wind, and biomass energy (Sovacool & Griffiths, 2020) . In addition, this approach also includes the improvement of environmentally friendly technologies, energy efficiency, and the adoption of sustainable business practices. However, while green economy strategies offer long-term solutions to address climate change, their implementation is not free from complex challenges (Edenhofer et al., 2011) .

Barriers to initiating the energy transition include economic, political and technological factors. Developing countries, for example, often face limited financial and technological resources to invest in renewable energy. In addition, many industries still rely on fossil fuels because the initial cost of switching to clean energy is considered prohibitive. On the other hand, resistance from interested parties in fossil energy-based industries also hinders the transition process (Boyle, 2012) .

Therefore, a holistic strategy is needed to promote a green economy that not only drives the energy transition but also delivers economic and social benefits. This strategy involves collaboration between the government, private sector, and society to create policies that support green investment, technological innovation, and social inclusion. As such, the main focus of this research is to explore green economy strategies as an important endeavour in navigating the challenges of global climate change, as well as how they can be effectively and sustainably implemented.

Research Methods

The study in this research uses the literature method. The literature research method is an approach used to collect, analyse, and evaluate information from written sources relevant to the research topic. The sources used are books, scientific journals, articles, official documents, or other publications (Creswell, 2013) ; (Kitchenham, 2004). The main purpose of this method is to understand and summarise previous research in order to build a theoretical foundation, identify research gaps, or support the arguments developed in the study. Researchers in this method systematically select quality and credible literature, then link the information obtained to answer research questions or formulate new ideas. This method is very effective in academic studies, especially when field data collection is not possible (Snyder, 2019) .

Results and Discussion

Green Economy-based Energy Transition Strategy

The energy transition is one of the most important steps in addressing the challenges of global climate change and building a sustainable future. In the context of a green economy, the energy transition strategy focuses not only on shifting resources towards renewable energy, but also on establishing an economic system that is environmentally friendly, inclusive and orientated towards long-term prosperity. These strategies aim to reduce dependence on fossil fuels that have a negative impact on the environment while harnessing the potential of clean energy to support more sustainable economic growth (Edenhofer et al., 2011) .

One of the key strategies in the green economy-based energy transition is increased investment in renewable energy technologies. These investments are made to support the development of energy sources, such as solar, wind, hydro and biomass energy. Increasing access to these technologies can significantly reduce carbon emissions and transform the global energy system to be more environmentally friendly. In addition, continued investment in renewable energy also creates economic opportunities through the development of new industries and job creation (Jacobs, 1991) .

Policy strengthening is an integral element of a green economy-based energy transition strategy. The government needs to take decisive steps through regulations that encourage the use of renewable energy and provide incentives for companies and individuals committed to green energy. Policies such as subsidies for renewable technologies, carbon taxes and public education programmes can accelerate the adoption of economic models oriented towards reducing environmental impacts (Steffen, 2018)

The role of the private sector is also crucial in driving the green economy-based energy transition. Companies can be the main actors in innovating and implementing green technologies across their operations. In addition, they can invest funds into green

energy projects, such as the construction of solar power plants or other renewable energy infrastructure. Cooperation between the private sector and the government can also increase the volume of investment and the effectiveness of strategy implementation (Rogelj et al., 2016) .

Public education and awareness is an essential aspect of the green economy-based energy transition. Educational programmes on the importance of clean energy use and the positive impact of changing habits can encourage people to better support and participate in the energy transition. People who are aware of the benefits of green energy tend to become wiser consumers, choose environmentally friendly products, and put pressure on the industrial sector to follow green economy principles (Blewitt, 2018) .

On the social side, green economy-based energy transition strategies must consider inclusiveness to ensure that no group is left behind. Changes in the energy system can impact the lives of people who still depend on conventional energy or workers in the fossil energy industry. Therefore, the strategy needs to include re-skilling and job diversification programmes so that they can shift to new sectors that are more in line with green economy principles (The World Bank, 2021) .

Improving energy efficiency is also an important part of the green economy-based energy transition. The use of energy-efficient technologies, whether in the household, industrial or transport sectors, can reduce overall energy consumption. Energy efficiency not only helps reduce carbon emissions, but also saves long-term operating costs, ultimately contributing to more resilient and sustainable economic growth (Victor et al., 2019) .

International financial support can accelerate the energy transition process, especially in developing countries. Developed countries or international financial institutions can provide economic assistance to support green energy development in financially constrained regions. With global collaboration, the development of green infrastructure such as solar or wind power plants will be more easily realised in areas that previously lacked access to clean energy (IPCC, 2018) .

At the same time, research and development efforts in the field of green energy must continue to be promoted. Technological innovation can bring new solutions to the challenges of the energy transition, in terms of efficiency, cost and sustainability. For example, the development of longer-lasting batteries or more advanced energy storage technologies can accelerate the large-scale adoption of renewable energy (Friedlingstein et al., 2022) .

Overall, a green economy-based energy transition strategy requires a holistic approach, encompassing technology investment, enabling policies, community engagement, inclusiveness, energy efficiency and international collaboration. By integrating these aspects, the world can transition to a cleaner energy system, while realising economic growth rooted in sustainability. Joint efforts between governments,

the private sector, and the global community are key to realising an energy transition that will bring long-term benefits to the environment, economy, and social well-being.

Inhibiting and Supporting Factors in the Energy Transition

The energy transition from fossil fuels to renewable energy is an important step in reducing negative environmental impacts, particularly in relation to greenhouse gas emissions. In this transition process, there are a number of inhibiting and supporting factors that influence it. These constraining and supporting factors must be properly considered in order for the implementation of the energy transition to be effective and sustainable (Le Quéré et al., 2015) .

One of the main inhibiting factors is the world's dependence on fossil fuels. Since the Industrial Revolution, fossil fuels have been the world's main source of energy for the transport, industrial and power generation sectors. Despite the growing popularity of renewable energy, many countries are still significantly dependent on fossil fuels, especially in regions with abundant oil, gas and coal reserves (Riahi et al., 2017) .

On the other hand, technology is also a challenge in the energy transition. The development of renewable energy technologies, such as solar panels and wind turbines, requires large investments. Some countries, especially developing countries, face constraints related to high costs that hinder the adoption of these technologies. In addition, the efficiency and storage of renewable energy are still important issues that need to be addressed for the technology to compete with fossil fuels (Acemoglu et al., 2012) .

A supporting factor for the energy transition comes from the increasing global awareness of climate change issues. International campaigns, such as the Paris Agreement, have successfully encouraged many countries to set carbon neutral targets. These commitments show that there is strong political and social momentum to accelerate the transition to clean energy (Fankhauser, 2016) .

The development of renewable energy sources has also received a strong boost from modern technological developments. Innovations in energy storage, such as lithium-ion batteries, are beginning to offer solutions to the challenges of renewable energy stability. This opens up opportunities for the integration of renewable energy into national energy systems, even in remote areas (Carnwell & Daly, 2001) .

In addition, support from the private sector is an important element in the energy transition. Many large companies, especially those in the energy sector, have begun to shift their investments to renewable energy projects as part of a sustainability strategy. Growing funding and investment from the private sector provides a significant boost to renewable energy development (International Energy Agency, 2022) .

Increased public awareness of the importance of clean energy has also been an important contributing factor. Environmental campaigns, education and access to public information have helped build public support for renewable energy

implementation. This provides the social legitimacy needed for major policy changes. However, another challenge is inadequate infrastructure. In many countries, including developing countries, energy distribution networks are not designed to support intermittent renewable energy sources such as solar or wind power. Large investments are required for grid modernisation to accommodate greener power generation (Shukla et al., 2022) .

Regulation also plays a role in accelerating or hindering the energy transition. Governments that do not have clear policies on renewable energy use are often a major barrier. In contrast, countries with clean energy subsidy policies or tax incentives for investment in renewable energy tend to transition faster (Pachauri & Meyer, 2014) .

With all the challenges, there is a great opportunity to accelerate the energy transition through cross-sector collaboration. Governments, the private sector, communities and international organisations must work together to overcome barriers and maximise enablers. This joint effort is expected to not only bring environmental benefits, but also promote sustainable economic growth.

Potential Impacts of Green Economy Implementation

The implementation of a green economy has the potential to bring significant positive impacts to the environment, society and the economy at the global and local levels. One of the most striking impacts is the reduction of greenhouse gas emissions, which have been the main cause of climate change. By shifting to more environmentally friendly economic practices, such as the use of renewable energy and sustainable resource management, countries can slow the rate of global warming that threatens the earth's ecosystems (Anderson & Bows, 2011) .

In addition, the implementation of a green economy can also encourage the preservation of natural resources. Many countries have been exploiting resources without considering long-term sustainability. With a green economy, resource utilisation patterns are designed to ensure their sustainability for future generations. This contributes to reducing the risk of natural resource scarcity, which was previously feared to hamper economic growth (Smith & Davis, 2018) .

It is also creating new opportunities in the employment sector. The transition to a green economy is driving the emergence of clean-tech jobs, such as renewable energy specialists, waste management managers and sustainability solution developers. In addition, traditional sectors can also undergo transformations that promote efficiency and sustainability. This helps to reduce unemployment while improving the quality of the workforce (Rockström ., 2009)

From a social perspective, a green economy has the potential to improve people's welfare. With reduced air, water and soil pollution, people have a healthier environment to live in. Diseases caused by pollution are minimised, resulting in reduced

public health costs. Ultimately, this supports a better quality of life for all in society (van Vuuren et al., 2014) .

Implementing a green economy also strengthens resilience to natural disasters. By protecting the environment and mitigating the impacts of climate change, the risk of natural disasters such as floods, droughts and extreme storms can be minimised. Infrastructure designed within a sustainable framework is also more resilient to the threat of climate change, so losses caused by disasters can be minimised (McNeill, 2001).

Another potential impact is the improvement of a country's economic competitiveness in the global arena. Countries that adopt a green economy tend to be better equipped to deal with the dynamics of international trade, especially with increasing demands for sustainability in global supply chains. Products that meet environmental standards become more competitive in international markets, allowing countries to increase exports and secure economic growth (IPCC, 2018) .

Equally important, the green economy encourages changes in people's consumption patterns. With sustainability campaigns, people are encouraged to choose products that are more environmentally friendly and reduce excessive consumptive culture. This change not only reduces pressure on ecosystems, but also teaches the values of responsibility for nature for future generations (Stern, 2006) .

A green economy also has the potential to boost technological innovation. In the process of transitioning to a more sustainable system, technological development is inevitable. Countries are competing to create efficient and environmentally friendly solutions to meet energy, transport and manufacturing needs. This brings long-term impacts in the form of a technological revolution that supports global sustainability (McGlade & Ekins, 2015) .

However, the potential positive impacts of implementing a green economy will not be realised without a strong commitment from the government, private sector and society. This transition requires substantial investment, supportive policies, and a cultural shift in the way development is viewed. Close collaboration between various parties is key for a successful green economy and optimal benefits (Stern, 2006) .

Overall, the implementation of a green economy is a strategic step needed to address environmental challenges while promoting global economic development. Despite the challenges, the long-term positive impacts are worth pursuing. With strong determination and cooperation at various levels, a green economy can be a real solution for a better and more sustainable future.

Conclusion

In the transition to a green economy, it is important for countries to adopt sustainable and innovative strategies to mitigate the impacts of global climate change. Green economic growth is not only beneficial in reducing carbon emissions, but also offers new opportunities to create jobs, improve energy efficiency and promote the use

of renewable energy. These strategies should include strategic measures such as the development of green technologies, investment in green infrastructure, and policies that encourage sustainable business practices.

However, the implementation of the green economy faces a number of challenges, including resistance from conventional fossil fuel-dependent industries and a lack of financial support for green projects. In addition, technological gaps between countries and varying capacities to deal with climate change are significant barriers. Therefore, international cooperation and strong commitment from various parties, including the public and private sectors, as well as society as a whole, are needed to ensure that this transition can be effective and equitable.

In facing the challenges of global climate change, the adoption of a green economy must be underpinned by supportive fiscal policies, public education on environmental sustainability, and innovation in resource use. Strict regulations and incentives for industry players to shift to environmentally friendly practices are also crucial components. Ultimately, successfully navigating the energy transition will determine the future of the planet and the well-being of the global community, making the green economy a solution that is not only economically relevant, but also ecologically crucial.

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