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Green Transition in the Energy Sector: Opportunities versus Threats

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Abstract

The circular economy or green economy has introduced green transformation for every sector and organization in the last decade. Energy is a factor of primary importance for economic growth and development. However, energy consumption and non-renewable energy sources have largely negative effects in the fight against climate change and global warming. In other words, the economic growth approach based on non-renewable energy sources does not bring a sustainable future. At this point, the green transformation in the energy sector has enabled both developed and developing countries to follow new and sustainable strategies. At the forefront of new and sustainable strategies are energy production based on clean and renewable energy sources and responsible energy consumption practices. This study is a mini review and it aims to explore future opportunities and threats by examining the advantages and disadvantages of new applications that emerged with the green transformation in the energy sector. It is thought to give a brief profile for green transition in the energy sector. The study focused on the side of energy sources and energy production in the context of energy sector. t

Keywords: Energy Sector, Energy, Green Economy, Renewable Energy, 2030 Sustainable Development Goals

1. Introduction

The Earth is a living system and many natural events, climate events and seasonal changes affect life on earth. Climate change can be considered the biggest real danger humanity faces in the 21 century (Yildirim et al., 2022; Yildirim, 2023; Sevik and Yıldırım, 2023; Yildirim et al., 2023). Considering the Earth as a living structure, it can be said that the continuity of its natural resources, ecosystem and biodiversity essentially depends on the healthy continuity of the planet (Yıldırım et al., 2024a; Yıldırım et al., 2024b). Although climate change is a natural event, it has gone beyond being a natural event due to human-induced activities. In other words, current global warming and climate changes are no longer natural, but a result of economically based human activities. At this point, new economic models and policies focused on sustainability are being developed to control the impact of climate change in the long term (Yıldırım et al., 2016).

The economic development and growth policies that humanity experienced with the industrial revolution have now come to an end. Because, due to conventional economic models, many problems that threaten the future, such as environmental degradation, pollution, excessive carbon emissions and global warming, have emerged in this century. Green economy and circular economy can be thought of as new economic growth models that countries are starting to adapt for a sustainable future (Yıldırım and Yıldırım, 2020). Therefore, Green transformation has given life to new and sustainable practices in every sector.

The energy sector is an important sector for sustainable development and is one of the leading areas for sustainable practices and green jobs. The energy sector, a diverse segment from building insulation to cloud technology, accounts for more than half of the green economy; food, agriculture, water and transportation are other important sectors. Investment in renewable energy resources and renewable energy production are among the prominent practices in the green transformation in the energy sector (Shinwari et al., 2021).

This study aims to explore positive and negative sides of renewable energy sectors through mini review. Green transformation in energy sector has created renewable energy sector. There is rapid growth of renewable energy sources in the world. Developed and developing countries prefer to invest in renewable energy sector. But policymakers should plan the share of renewable energy sources in the context of its positive and negative sides in the long term.

2. Renewable Energy Sector: Opportunities and Threats

2030 Sustainable Development Goals includes Goal-7 which aims to achieve accessible clean energy for everyone (Yildirim, 2021). Within the scope of this purpose, countries are making investment-oriented plans in renewable energy resources and trying to shift the distribution of energy resources towards renewable resources (Liu et al., 2022; Hossain, 2024). With investment in renewable energy resources, new employment areas and new types of funding have emerged in countries. Essentially, green transformation has brought innovations in investment and financial matters in the energy sector (Joint Research Centre, 2022).

Renewable energy sectors include alternative and green energy sources as (United Nations, n.d):

- Bioenergy: Bioenergy can be considered as an energy source obtained from various organic materials as biomass and agricultural products for liquid biofuels.
- Hydropower: Hydroelectricity is a water-based energy source. Water movement is required to produce energy. Water resources must be available for this energy.
- Geothermal: Geothermal energy uses accessible thermal energy from the Earth's interior.
- Wind: Wind energy is a spatially applicable energy source both on land and in water. Energy is collected with large wind turbines.
- Solar: Solar energy is the most popular energy source among renewable energy sources. Energy can be collected with solar panels in suitable places in all countries.

Alternative energy sources have been included in the literature as renewable energy sources. In the context of sustainable development goals, countries invest in renewable energy sources instead of fossil resources and aim to meet their energy needs with alternative energy production. According to result of mini review, some main opportunities and threats are examined as below (Howell 2022; Consumer Energy Solutions, 2022; Osman et al., 2023; LAkeh, 2024; Tajne, 2015; The Wilderness Society, 2023; Thoubboron, 2022; Gomstyn, 2024; Ebube and Akan, 2021; Moore, 2019; ElectricRate, 2023):

2.1. Side of Opportunities

- **Opportunity 1:** Fossil resource ownership is a sign of power among countries in the world. Countries rich in energy resources have enjoyed a great advantage for many years. However, the danger of depletion of fossil energy resources and global warming have brought alternatives to these resources. Renewable energy sources have changed the balance of energy-related power among countries in the world against fossil energy sources. With the transition to alternative energy sources, countries have gained the ability to ensure energy security and foreign dependency on energy can be reduced.
- **Opportunity 2:** As an opportunity, renewable energy sources provide countries with a more equitable approach to accessing clean energy. People can access clean energy at affordable prices within the scope of energy security based on renewable energy sources. However, in energy infrastructures based on fossil energy sources, people's access to energy is expensive and unequal.
- **Opportunity 3:** Since renewable energy sources are environmentally friendly, they are the primary energy application area in the fight against climate change. Thus, environmental benefits such as minimizing carbon emissions, efficient use of natural resources, and keeping environmental damage to a minimum can be achieved.
- **Opportunity 4:** The growth of investments in renewable energy sources has created a new field of economic employment. Green jobs and green-collar workers are mostly employed in the renewable energy sector and provide great economic benefits to countries.

2.2. Side of Threats

- **Threat 1:** When renewable energy sources are examined, it is seen that they do not exist or are not produced 24/7. There may be interruptions in energy production, especially since these resources are directly dependent on climate and seasonal conditions. Alternative energy sources may not be used at the same intensity in every country. Dependence on 100% renewable energy sources can be risky in energy security.
- **Threat 2:** The efficiency rate of energy produced from renewable sources is much lower than that of energy produced from fossil-based energy sources. At this point, countries depending only on the renewable energy sector as an energy source may create some problems.
- **Threat 3:** Building a system based on renewable resources can be expensive. In other words, infrastructure, licenses, employees and other inputs for renewable energy may be lacking in many institutions and countries. In individual use, it is seen that people face the problem of lack of infrastructure and high prices in their provision.
- **Threat 4:** Renewable energy facilities need large areas as working areas. Compared to energy facilities that use fossil fuels as a land sharing ratio, energy facilities based on renewable resources need larger areas.
- **Threat 5:** some renewable energy sources can be harmful for ecosystem and related biodiversity in the long term.

3. Conclusion

Green transformation in the energy sector can ensure the establishment of the balance between the economic, social and environmental dimensions envisaged by sustainable development.

For example, it can be said that the biggest change is the increase in investments and employment based on green and alternative energy sources in the energy sector. This investment and employment can be considered as economic benefits. On the other hand, access to clean and affordable energy can increase people's social welfare, and production based on environmentally friendly energy sources can help protect environmental quality. Although the development of the energy sector based on renewable energy sources promises hope for a sustainable future, there are issues that need attention.

Important issues can be listed as follows:

- Determining the most advantageous among renewable energy sources and making investments in this direction,
- Planning should be done by carefully considering the disadvantages of renewable energy sources,
- More affordable installation processes can be planned for individual energy production,
- Solving the requirements such as information and licenses required for the installation of some renewable energy resources through international cooperation,
- Determining the renewable energy resources that can be used the most and for the long term in accordance with the country's conditions.

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