

PROCEEDINGS OF THE  
INTERNATIONAL CARBON NEUTRALITY TRAINEESHIP PROGRAM  
Volume.02, Number.1, 2024, 157-159

# The Role of Renewable Energy Achieving Carbon Neutrality

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## Abstract

With the increasing severity of global climate change, reducing the use of fossil fuels and switching to renewable energy has become an urgent task for us to achieve the goal of carbon neutrality. This paper will focus on the role of renewable energy in achieving carbon neutrality. First, we will introduce the background and types of renewable energy, and then explore the role of renewable energy in reducing greenhouse gas emissions, lowering carbon footprints, driving sustainable development, and promoting economic growth. Finally, we will discuss the challenges and future directions of renewable energy.

**Keywords:** Renewable energy; carbon neutrality.

## 1. Introduction

In recent years, the impact of global climate change on human society and the natural environment has become more and more obvious. Numerous scientific studies have shown that greenhouse gas emissions are one of the main causes of climate change. In order to combat climate change, the international community generally recognizes the need to take measures to reduce greenhouse gas emissions. As a clean and pollution-free form of energy, renewable energy has attracted the attention of more and more countries and regions, and has become an important means to achieve the goal of carbon neutrality.

**Background and types of renewable energy** Renewable energy refers to those forms of energy that can be used sustainably and are naturally renewed, such as solar, wind, hydro, biomass, etc. Compared to fossil fuels, renewable energy has the advantage of unlimited supply and reduced greenhouse gas emissions. Various renewable energy technologies are being developed and promoted, providing strong support for achieving the goal of carbon neutrality.

**The role of renewable energy in reducing greenhouse gas emissions** Renewable energy mainly reduces greenhouse gas emissions by reducing dependence on fossil fuels. Solar and wind are the most common forms of renewable energy, and they produce almost no greenhouse gases in the process of generating electricity. In fact, the large-scale use of solar and wind energy can replace fossil fuels for power generation, fundamentally solving the

problem of carbon emissions. In addition, biomass energy and hydropower can also be used as clean energy to replace fossil fuels, and their utilization process produces less greenhouse gases, which plays an important role in reducing greenhouse gas emissions.

**The role of renewable energy in reducing the carbon footprint** A carbon footprint is the total amount of greenhouse gases released by an individual, company or country during production and consumption. The widespread use of renewable energy can reduce the carbon footprint. For example, replacing traditional coal-fired boilers and traditional electricity supply with solar water heaters and solar photovoltaic power generation systems can significantly reduce carbon emissions. In addition, the promotion of electric vehicles and the use of biomass as a transport fuel can also reduce the carbon footprint.

**The role of renewable energy in promoting sustainable development** The use of renewable energy can drive sustainable development. Traditional forms of energy are more damaging to the environment, while renewable energy is sustainable and environmentally friendly. By promoting renewable energy on a large scale, it is possible to reduce dependence on natural resources, reduce the insecurity of energy supply, and promote the green development of the economy. In addition, the development of the renewable energy industry has provided new opportunities for employment, driving innovation and technological progress in the field of sustainable development.

**The role of renewable energy in promoting economic growth** The development of renewable energy is not only good for the environment and sustainable development, but also plays a positive role in promoting economic growth. First, the rise of the renewable energy industry provides a good foundation for the creation of new jobs. From energy production to R&D and manufacturing, the renewable energy industry spans a wide range of sectors and provides employment opportunities for a wide range of skilled and professional talents. In addition, the widespread use of renewable energy can also reduce energy costs, improve energy efficiency, reduce energy import dependence, and further promote economic growth.

**Challenges and future development directions of renewable energy** While renewables have great potential to achieve carbon neutrality goals, they still face some challenges. These include the high cost of technology, energy storage issues, the sustainability of the power grid, etc. In the future, it is necessary to continuously increase investment in renewable energy R&D and innovation, and strengthen international cooperation to jointly address the challenge of climate change. At the same time, the government, enterprises and individuals should actively participate in the promotion and application of renewable energy, and accelerate the development and application of renewable energy through policy support and market mechanism guidance.

## 2. Result

Renewable energy plays an important role in achieving carbon neutrality. By reducing greenhouse gas emissions, lowering carbon footprints, driving sustainable development and boosting economic growth, renewable energy provides key support for our low-carbon, environmentally friendly and sustainable future. However, the challenges we face also need to be addressed together and strengthened cooperation to achieve the sustainable development of global renewable energy.

## 3. Discussion

The development of renewable energy can contribute to the goal of carbon neutrality to a certain extent. However, the development of renewable energy still faces many challenges. For most developing countries, the diffusion and use of renewable energy requires significant investment and technical support, and these costs may hinder the adoption and adoption of the technology. In addition, many developing countries have long relied on fossil fuels such as coal, and switching in a short period of time could lead to energy instability and risks. Therefore, while achieving the goal of carbon neutrality, energy security and the stability of the energy market need to be considered. On the other hand, while renewables can contribute less to carbon emissions, it is not a one-size-fits-all solution. For ex-

ample, solar and wind power generation has a certain instability, and energy storage technology is needed to avoid temporary power outages on the supply side, and energy storage technology is more expensive. In addition, the entire supply chain, from the extraction of renewable energy to its delivery to third-party consumers, requires addressing a complex range of environmental and social issues. In other words, renewable energy technologies are only one means to achieve carbon neutrality, and all expectations should not be placed on it. In conclusion, while renewable energy can contribute to reducing carbon emissions and achieving carbon neutrality goals, we also need to be aware of the real-world challenges it faces in terms of its promotion, application and development. Therefore, we need to take a series of measures, including technological innovation, policy formulation, market mechanism building, and international cooperation, to support the wider application and more sustainable development of renewable energy in achieving carbon neutrality goals.

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