

Exploring the Strategies and Effects of Green Certificates in Promoting New Energy Development

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Abstract: In the critical period of global energy structure transformation, the development and utilization of new energy have become an important force in promoting sustainable development. Green certificates, as a market-oriented environmental policy tool, play a crucial role in fostering the development of the new energy industry. This paper delves into the issuance and trading mechanisms of green certificates, incentive policies, and their implementation effects internationally, exploring how green certificates effectively promote the expansion of the new energy market and technological innovation, while assessing their contribution to environmental protection. The research findings indicate that, although green certificates have achieved some success in driving the development of the new energy industry, they face challenges such as market acceptance and insufficient policy support. The article concludes with strategic recommendations for optimizing the green certificate system, aiming to provide theoretical support and practical guidance for the improvement of relevant policies.

Keywords: Green certificates, new energy, renewable energy, market incentives, environmental policy

1. Introduction

The development of new energy has become the focus of global energy policy, especially in the context of increasingly severe climate change and environmental degradation. To address these challenges, multiple countries have adopted various market mechanisms, including green certificates, aimed at promoting the production and consumption of renewable energy through economic incentives. The green certificate system allows energy producers to obtain a tradable certificate after generating a certain amount of renewable energy, which not only promotes the commercialization of new energy technologies but also accelerates the transition from traditional to renewable energy sources. However, despite the vitality that green certificates have injected into the new energy market, their effectiveness and widespread adoption are still limited by a variety of complex factors in the market and policy environment. Therefore, a thorough analysis of the strategies, effects, and challenges of green certificates is of significant importance for global energy policymakers.

2. Mechanisms and Implementation of Green Certificates

The green certificate system is a market-based tool designed to increase the production and use of renewable energy through economic incentives. Its core mechanisms include the issuance, trading, and retirement of certificates, each of which plays a significant role in promoting the healthy development of the new energy market[1].

2.1. Definition and Classification of Green Certificates

Green certificates, also known as Renewable Energy Certificates (RECs), are documents that prove a certain quantity of electricity has been generated from renewable energy sources. These certificates provide an additional source of revenue for energy producers, making investment in renewable energy projects more attractive. From a classification perspective, green certificates can be categorized according to the type of generating source (such as wind, solar, hydro, etc.), with different types of certificates possibly having different market values due to their environmental benefits.

2.2. Issuance and Trading Mechanisms of Green Certificates

The issuance of green certificates is typically handled by national or certifying bodies to ensure that all renewable energy generation is accurately recorded and certified. Once a renewable energy plant produces electricity, the corresponding green certificates are issued, and energy producers may choose to sell these certificates on specialized markets or retain them to meet government-mandated renewable energy quotas. Trading mechanisms generally include direct trading and public market transactions. Direct trading allows producers to sell certificates directly to interested buyers, while public market transactions are conducted through trading platforms, increasing transaction transparency and liquidity[2].

2.3. International Case Studies and Experiences in Green Certificate Trading

Various countries have implemented different green certificate systems based on the maturity of their energy markets and policy environments. For example, European countries widely use green certificates to meet their renewable energy targets, compelling electric companies to purchase a certain proportion of green certificates, thereby driving the development of new energy throughout the region. In the United States, some states have set Renewable Portfolio Standards (RPS) that require electricity suppliers to purchase green certificates to prove they meet certain renewable energy supply ratios. These cases show that, while the details of implementation may vary, the core incentive mechanisms are similar and operate through market means to promote the growth of renewable energy.

3. Green Certificates in Promoting New Energy Development

The green certificate system is not just a simple market trading tool but also an effective policy instrument for fostering the development and application of new energy technologies. By analyzing its role in incentive policies, we can better understand how green certificates accelerate the marketization process of new energy.

3.1. Policy Incentives and Market Driving Mechanisms

The core function of green certificates is to provide additional economic incentives for new energy production. Most national governments have set renewable energy quota systems, requiring electricity companies or large energy consumers to purchase a certain percentage of green certificates.

This policy ensures a continuously increasing proportion of new energy in the energy mix. For example, a government may mandate that by a certain year, 20% of the country's energy consumption must come from renewable sources. To meet this target, power suppliers need to hold green certificates in proportion to their energy purchases or production, proving compliance with renewable standards[3].

This mechanism not only enhances the economic attractiveness of new energy projects but also promotes ongoing technological upgrades and cost reductions. Market competition enables the rapid dissemination of more effective, lower-cost new energy technologies, which in turn drives technological innovation and economies of scale in related industries.

3.2. Green Certificates and Financing New Energy Projects

Green certificates increase the financial viability of new energy projects, providing crucial support for attracting funding. These certificates can be seen as an additional income source for new energy projects, enhancing investor confidence because the investment involves not just a single energy project but also involves market-tradable green certificates. Banks and other financial institutions generally prefer to invest in projects with stable income returns, and the existence of green certificates makes these new energy projects more attractive for financing.

For instance, the construction and operational costs of a solar power plant can be offset by selling the green certificates associated with the electricity it generates. This not only improves the overall financial evaluation of the project but also reduces investment risks, making it easier for such projects to secure initial investment and ongoing financing[4].

3.3. Application and Effects of Green Certificates in Different Countries' Energy Policies

The global application of the green certificate system demonstrates its adaptability and flexibility. Different countries, according to their energy structures, economic conditions, and environmental goals, have formulated various strategies to implement and optimize the green certificate system.

In Scandinavian countries, the government combines green certificates with energy tax policies, using tax incentives to further encourage companies and individuals to consume green energy. For example, companies using renewable energy may receive tax reductions or other financial subsidies, making this energy cost comparatively lower and encouraging more energy consumers to switch to renewable energy.

In the United States, different states have established Renewable Portfolio Standards (RPS) and green certificate systems based on their environmental and economic needs. This layered policy framework not only ensures the diversity and breadth of new energy technologies but also increases market liquidity and flexibility through interstate certificate trading.

4. Environmental Benefits and Economic Impacts of Green Certificates

Green certificates not only foster the technological and market development of new energy but also have profound effects on the environment and economy. By analyzing these impacts, we can more comprehensively evaluate the comprehensive value of the green certificate system.

4.1. Direct Impact on Carbon Emissions

The green certificate system incentivizes the generation of more renewable energy, directly reducing dependence on fossil fuels, thereby significantly lowering carbon emissions. Each unit of renewable electricity produced and certified by green certificates equivalently reduces the amount of carbon emissions. This mechanism not only helps countries meet their international climate agreement

emission reduction commitments but also provides practical solutions for global climate change mitigation.

4.2. Economic Stimulus from the New Energy Industry

By providing economic incentives, the green certificate system has greatly promoted the development of the new energy industry. New investments and technological advancements have created numerous job opportunities, particularly in the solar and wind energy sectors. Furthermore, as new energy technologies mature and production scales up, their costs decrease, making renewable energy more competitive, promoting economic growth, and altering the structure of traditional energy markets[4].

4.3. Impact of the Green Certificate System on Traditional Energy Markets

The promotion of green certificates also impacts the traditional energy market. As the proportion of renewable energy increases, the demand for traditional energy sources, particularly coal and oil, begins to decline. This poses new challenges for the economic structures and energy policies of energy-producing nations. At the same time, it drives the global energy market towards cleaner and more efficient directions.

Overall, green certificates have not only effectively driven the development of new energy through market incentive mechanisms but have also brought positive environmental and economic benefits, profoundly influencing the structure and function of traditional energy markets. The multifaceted impacts demonstrate the significant role of the green certificate system in global energy and environmental governance.

5. Challenges and Future Outlook

While the green certificate system has been implemented in many countries and achieved certain effects, it still faces a series of challenges that need to be overcome through continuous policy innovation and market adjustment. Additionally, it is necessary to delve into the future direction of development.

5.1. Real Challenges Facing the Green Certificate Market

First, market volatility is a major issue faced by the green certificate market. Due to reliance on market demand and supply fluctuations, prices of green certificates can experience significant volatility, which may impact investor confidence and decision-making. Secondly, insufficient regulation is also a problem. In some countries, the lack of effective regulatory mechanisms may lead to market manipulation and fraudulent activities, undermining the credibility of the green certificate system. Moreover, technological limitations may also hinder the effective implementation of green certificates, especially in ensuring the transparency and traceability of energy generation and consumption[5].

5.2. Directions for Improvement in Policies and Market Mechanisms

To overcome these challenges, improvements are needed at both policy and market levels. On the policy front, more stable support mechanisms, such as setting minimum price guarantees and increasing government purchases, could be introduced to reduce market fluctuations. Additionally, strengthening regulation to ensure the fairness and transparency of the green certificate market is crucial to preventing manipulation and fraud. On the market side, promoting more advanced technologies to improve the efficiency of energy tracking and management ensures the authenticity and effectiveness of green certificates.

5.3. Predictions for Future New Energy Development Trends

Looking ahead, as the urgency to address climate change increases and technology continues to advance, green certificates are expected to continue playing a significant role. The green certificate system might evolve towards greater efficiency and inclusiveness, for example, by linking with international carbon markets to enhance its global impact. Additionally, leveraging digital technologies like blockchain to enhance the management efficiency and transparency of green certificates is also a potential future direction[6].

6. Conclusion

the green certificate system has shown immense potential in advancing new energy and sustainable development policies. However, its successful implementation in the future will depend on effectively addressing current challenges and continuing policy innovation. Through continuous optimization and improvement, green certificates are poised to play a greater role in achieving global energy transformation and climate goals.

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