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Research on Green Premium in New Energy Industry under the Background of Double Carbon

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Abstract

Achieving carbon peak and carbon neutral is a broad and profound economic and social systemic change. By analyzing the shortcomings of the current situation of China's new energy industry, this paper analyzes the factors influencing the green premium of the new energy industry, which are the development of new technologies represented by non-fossil energy technologies, the price of carbon, and the cost of carbon capture and storage technologies. Finally, four measures are proposed to reduce the green premium by strategically formulating new energy development plans, continuously improving new energy R&D and innovation capabilities, improving policy mechanisms related to the new energy industry and vigorously promoting international exchanges and cooperation.

Keywords

Carbon Peaking; Carbon Neutrality; New Energy Technologies; Green Premium.

1. Introduction

Since the outbreak of the new crown epidemic, economies around the world have been affected to varying degrees. At the same time, the frequency of extreme meteorological disaster events is also increasing. Facing the pressure of the new epidemic and climate crisis, it has become our main task in this new era to achieve economic recovery and combat climate change through green and low-carbon development [1]. This is also the first time that the concept of double carbon was introduced. The 3060 target is China's solemn commitment as a responsible power to contribute Chinese solutions to the community of human destiny. The study of the green premium of new energy industry in the context of double carbon will help China to abandon the development model that damages the ecological environment, seize the huge development opportunities brought by green transformation, and promote the transformation and upgrading of economic, energy and industrial structures with innovation as the driving force, so as to achieve green recovery and development, and let a good ecological environment become the support for sustainable economic and social development.

2. Literature Review

2.1. Current Status of Foreign Research

European countries are the first to realize the problem of climate change and pay attention to the development of clean technologies. The European Union peaked its carbon emissions in 1990, and the technological competition among countries in the field of green and low-carbon has been intensifying, and the issue of carbon emission reduction has become a hot spot in foreign academic research. Loftus et al. (2015) studied several scenarios based on different technologies in order to explore the relative feasibility of global decarbonization options, and

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argued that they should be complemented by more detailed analysis in order to make reliable decisions and address key constraints to energy system transition.

2.2. Current Status of Domestic Research

In the context of double carbon, new energy companies, as important subjects in building a market-oriented green technology innovation system in China, need to maintain their innovation momentum while taking into account environmental protection in their development [2]. Therefore, scholars in China have conducted a study on the green premium of the new energy industry in a dual carbon context. Therefore, scholars in China have conducted many studies on the green premium of the new energy industry in the dual-carbon context, and there are three main types of literature related to this issue: firstly, studies on the dual-carbon strategy, secondly, studies on the development of the new energy industry in the dual-carbon context, and thirdly, studies on the green premium issue.

2.2.1. Research on Dual Carbon Strategy

Faced with the intensified international competition in green low-carbon technologies, and considering that China's overall technology level is slightly inferior to that of developed countries in Europe and the United States, Liu Renhou et al. (2022) point out that the construction of green low-carbon technology systems and research on innovation paths should be accelerated to ensure that China achieves its dual-carbon goal on schedule. Opportunities and challenges often coexist, and the new crown epidemic has adversely affected the global value chain. Chen Shiyi and Xu Lu (2022) suggest that China should take advantage of the opportunity to achieve the double carbon target to build a global green value chain [3] and play a leadership role to enhance its position and promote the sustainable development of global value chains.

2.2.2. Research on the Development of New Energy Industry under the Background of Double Carbon

During the 13th Five-Year Plan period, China's new energy industry has achieved remarkable development results, and it still has good potential for development during the 14th Five-Year Plan period, and will become the core force of China's new energy supply. Zhang Hongxia et al. (2022) point out that in order to better achieve the strategic development goal of double carbon, we should continue to vigorously promote energy supply reform, clarify the development trend of new energy, build a perfect new energy development mechanism, and create convenient conditions for the sustainable development of new energy in China.

2.2.3. Research on the Issue of Green Premium

Zhao and Li (2021) proposed that the implementation of the dual carbon strategy is a broad and profound change, which cannot only rely on government promotion, but also needs to mobilize a wider range of social subjects to participate in it through economic incentives, analyze the economic feasibility of carbon neutral technology from the perspective of green premium, further promote the comprehensive development of the new energy industry, and help achieve the dual carbon goal [4].

In summary, there is still room for innovation in the research on the development of new energy industry in the context of dual carbon. According to the existing literature, we find that the feasibility analysis based on green premium has been initially applied. However, few scholars have paid attention to the research on the green premium of new energy industry in the context of dual carbon, so this paper will focus on this issue for a more in-depth discussion.

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3. The Shortcomings of the Current Situation of China's New Energy Industry

3.1. The New Energy Industry Unification Problem is Outstanding

In the global context, as Europe and the United States and other scientific and technological powers began to develop new energy industries earlier, some EU countries such as Germany have achieved carbon peak in the 1990s, the United States in 2007, most of these developed countries have put forward the goal of achieving carbon neutrality around 2050. China is facing the transition from a large manufacturing country to a strong manufacturing country, and is still in the industrialization stage, with a serious high carbon energy structure and carbon emissions that have not yet reached their peak [5]. In order to achieve the double carbon target as scheduled, the country has issued many relevant policies to support the new energy industry, and the whole industry has been developing strongly, but at the same time, it has also led to an imbalance between the actual production scale and the market development demand, which has limited the sustainable development of the new energy industry.

In 2021, China sold 3.521 million new energy vehicles, up 1.6 times year-on-year, ranking first in the world for seven consecutive years. However, as an emerging industry, the new energy vehicle industry has many shortcomings in various aspects. At present, it seems that one of the more significant problems is that the construction of supporting facilities is not perfect. Although the production and sales of new energy vehicles are growing at a rapid rate, the sales of new energy vehicles still account for a very small percentage of China's auto sales [6]. This is related to the imperfect construction of its charging facilities. For fuel cars, gas stations can be found everywhere, but new energy vehicles face the problem of difficult charging, which hinders the popularity of new energy vehicles.

3.2. The Level of New Energy Technology Research and Development is Insufficient

The new energy industry developed rapidly in the early stage by taking advantage of policies, however, from the trend into reality, it is destined to experience the difficulties encountered by traditional industries. In the current situation, many enterprises focus too much on the research and development of new energy products, neglecting the subsequent theoretical research and the promotion of results, resulting in poor product practicality. In addition, many new energy products sold on the market are processed and transformed from traditional industrial products, and for consumers, they do not experience a strong innovative force. Before the breakthrough of the core technology of new energy, the whole industry is actually bound, the added value and net profit of the products are low, and no sustainable business model has been formed.

Carbon trading is strategically important as one of the means to reach carbon peaking and carbon neutrality. However, the construction of China's carbon trading market started late, with the implementation of the carbon emissions trading system only in 2016 and the regulation of the national carbon emissions trading and related activities in 2021, and compared with developed countries, China's carbon trading system is obviously lagging behind. A mature carbon trading market can promote the development of new energy industries, advance new energy technologies, fully realize the independent development of products such as refined oil and gas extraction, gas turbines and core processors for power grid systems, and strengthen the research and development of cutting-edge technologies in energy fields such as carbon capture and fuel cells, so as to achieve leapfrog development with good technological reserves.

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3.3. Inefficient Planning and Management of New Energy Industry

Since China proposed the double carbon goal, just after less than three years, the new energy industry has achieved good development results. However, compared with developed countries, China's new energy industry still has the problem of inefficient development planning and management [7].

First, the industrial development goals are not clear enough to provide effective support for specific innovation paths, the management activities lack organization, and energy security is difficult to guarantee. The reason why new energy development has security problems is, on the one hand, because some kinds of new energy are affected by weather conditions, and on the other hand, because the current energy storage technology cannot meet the demand for large-scale, long-cycle energy storage.

Secondly, China's new energy industry has not formulated a sustainable development strategic plan in the development process, and the construction ideas and innovation paths of new energy technology system are lacking in subsequent improvement, which hinders the further development of the industry. Take the charging infrastructure of new energy vehicles as an example, by the end of 2021, there were 7.84 million new energy vehicles in China, and the total number of charging piles was about 2.167 million, with a car-pile ratio of 3:1, which still has a large vacancy. In addition, the spatial layout of charging piles is also very unreasonable. Compared with the urban areas where charging facilities are densely distributed, the number of charging piles on highways is very different, and it is extremely inconvenient to travel long distances, so new energy vehicles are currently mostly used for intra-city travel and are subject to more restrictions.

4. Analysis of Factors Influencing the Green Premium of China's New Energy Industry in the Context of Double Carbon

4.1. New Technology Development Represented by Non-Fossil Energy Technologies

The global energy mix transition has gone through three main phases, from coal-based to oil and gas-based, and is now transitioning to non-fossil-based energy sources[8]. Non-fossil energy refers to energy sources other than coal, oil, natural gas and other types of energy formed by geological changes over a long period of time and for one-time use only, including new and renewable energy sources, including nuclear energy, wind energy, solar energy, hydro energy, biomass energy, geothermal energy, ocean energy and other renewable energy sources.

The cost of using non-fossil energy sources determines the economic competitiveness of zero-carbon technologies. In the past, the focus of building a new energy industry in China has been mainly on reducing actual carbon emissions, but, from a sustainability perspective, more emphasis must be placed on carbon removal technologies in order to achieve overall deep decarbonization. Therefore, if the cost of non-fossil energy is high, achieving carbon neutrality will be very difficult, and it will be difficult to reduce the green premium as expected.

4.2. Price of Carbon

The green premium can be understood as a cap on the amount of money a firm is willing to pay to purchase carbon emissions. Typically, companies with lower carbon abatement costs are more willing to reduce carbon emissions, while companies with higher carbon abatement costs are less likely to reduce carbon emissions voluntarily. The reason fossil energy is less expensive is that carbon emissions are in most cases free. If the price of carbon reflects the negative externalities of climate change, even if the cost of non-fossil energy technologies cannot be reduced significantly, the rising cost of using fossil energy can reduce the green premium.

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The carbon market is a market-based mechanism that uses the price of carbon as a baton and allows companies that do not meet carbon emission reduction targets to purchase carbon allowances in the market to offset the additional carbon dioxide they produce through the allocation of allowances. In this way, when the cost of purchasing carbon allowances exceeds the green premium, companies will be more inclined to make a green transformation and reduce carbon emissions by developing new energy technologies.

4.3. Cost of Carbon Capture and Storage Technologies

The price of CCS (carbon capture and storage) is actually the upper limit of the cost of zero carbon technologies, because it is always possible to achieve zero carbon emissions through emission-capture-storage in the absence of other viable technologies. CCUS (carbon capture, utilization and storage) technology is a new trend in CCS technology, which is to capture and purify carbon dioxide emitted from production processes and then put it into a new production process It is a technology to recycle and reuse or storage.

Although the carbon dioxide capture, utilization and storage (CCUS) technology is developing rapidly, the model of coal-fired power plants supplemented by CCUS is gradually accepted, and the carbon emission of coal-fired power generation is gradually achieved in a controllable manner, in order to fundamentally achieve the goal of double carbon, the proportion of coal-fired power generation should be continuously reduced, the proportion of renewable energy power generation should be gradually increased, and the proportion of gas-fired power generation should be steadily increased. However, in order to achieve the double carbon goal, we should continue to reduce the proportion of coal-fired power generation, gradually increase the proportion of renewable energy generation, and steadily increase the proportion of gas-fired power generation, so as to promote the global power structure to a diversified pattern of coal (CCUS), natural gas, and renewable energy, thereby reducing the green premium.

5. Measures to Reduce the Green Premium of China's New Energy Industry in the Context of Double Carbon

5.1. Strategic Planning of New Energy Development

Under the background of double carbon, in order to promote the sustainable development of China's new energy industry and reduce the green premium, industrial policy makers and managers should make their development plans based on long-term strategies, improve the actual efficiency of energy use and strengthen the guiding role of new energy planning. While improving relevant policies, our government should clarify three positions: First, it should clarify the position of new energy technology system and promote the establishment of relevant technology standards, evaluation, trading and certification systems; second, it should clarify the position of technology demand, sort out the technology demand at different stages of development according to the 3060 dual carbon target, and guide the optimization of New energy technology development route[9] The third is to clarify the positioning of innovation subjects and paths, and sort out the innovation subjects of national laboratories, enterprises, universities and research units, so as to guide the innovation paths of specific new energy technologies. In terms of specific measures, we can start from two aspects: efficient and clean utilization of coal and efficient utilization of oil and gas resources, accelerate breakthroughs in key technologies for clean and efficient utilization of coal, significantly reduce carbon emissions or achieve no carbon emissions, and vigorously promote clean energy substitution in oil and gas extraction.

5.2. Continuously Enhance New Energy R&D and Innovation Capabilities

The key to achieving carbon neutrality is to reduce the green premium. There are two main ways to reduce the green premium, increasing the cost of fossil energy and reducing the cost of

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clean energy use. If we only rely on increasing the cost of fossil energy to reduce the green premium, it is obviously not in line with the laws of economic operation. The ideal approach is to reduce the cost of using clean energy, which involves the development and promotion of new energy technologies.

Facing the innovation of new energy technology system under the new development concept, different kinds of resources should be integrated scientifically and the R&D and innovation capacity of basic research and frontier technology should be enhanced simultaneously. Constructive suggestions from the industry should be actively adopted to realize the integrated development of wind energy technology, nuclear energy technology, as well as various energy-saving and emission reduction technologies and renewable energy technologies to ensure the recyclable use of various new energy resources and reduce the green premium. In terms of specific measures, we can set up national laboratories related to new energy technologies, strengthen the training of talents in universities, coordinate the resources of research institutes and universities, innovate technology development models, integrate the resources and technical advantages of enterprises, form new industrial innovation platforms, encourage the open sharing of data and related facilities, and conduct special research on key technologies for carbon neutrality and common technologies for emission reduction in energy, industry, transportation and construction industries. Take new energy vehicles as an example, with the withdrawal of national and local subsidies, the whole industry has come to a short stagnation, and the new forces of car manufacturing will usher in a major reshuffle, and new energy vehicle enterprises can only achieve a major technological breakthrough in order to gain a permanent foothold in the market.

5.3. Improve the Policy Mechanism Related to New Energy Industry

Improve the dual control policy on total carbon emissions and intensity, build a unified carbon emission accounting standard, play the role of carbon trading, increase the cost of emissions through carbon market pricing, encourage the application and development of new energy technologies, and form an effective incentive and restraint mechanism. Formulate fiscal, tax, value, investment and financial policies, increase the support of green bonds and green credit for new energy industry projects, explore diversified financial innovation products, further release market vitality, guide and encourage private enterprises to actively participate in technological innovation, and at the same time play the advantages of state-owned enterprises in terms of capital, technology and platform to jointly promote the development of new energy technology and the double carbon goal, and reduce the green premium. Based on the construction of renewable energy demonstration zones, we will set up carbon-neutral national demonstration zones to lead the development of carbon-neutral technologies and industrial cycles, help regional economic and social quality development and the realization of national carbon-neutral targets, and provide cities and regional models for China to achieve the double carbon target.

5.4. Vigorously Promote International Exchanges and Cooperation

Strengthen cooperation with Western countries such as Europe and the United States, strive for a favorable international environment, carry out relevant new energy technology cooperation based on addressing climate change, give full play to the role of multi- and bilateral cooperation and high-level dialogue mechanisms, and explore the establishment of an international cooperation mechanism with shared risks and benefits [10]. Correctly understand the general environment of international scientific and technological competition, improve the capacity and level of independent innovation of new energy technology, actively participate in the formulation of relevant technical standards, and strive for the initiative of technology in relevant fields. Give full play to China's advantages, and Europe and the United States and other countries to carry out in-depth cooperation, on the one hand, expand the

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market to promote the export of China's new energy products, on the other hand, the formation of advantageous core technology, increase the scale of leading technology, and to achieve the overall improvement of the new energy technology system, thereby reducing the green premium. Strengthen cooperation with other developing economies and make full use of the advantages of large-scale markets to promote the export of advantageous clean energy technologies, industries and products. Carry out new energy technology cooperation, establish common standards for technologies among cooperating countries and further strengthen technological innovation through multi-scene applications; carry out upstream and downstream cooperation in the supply chain and secure the long-term development of China's new energy technology system in multiple ways.

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