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Research on Investment Value and Investment Opportunity of Renewable Energy under Carbon Trading Mechanism

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Abstract

The goal of "double carbon" (peak carbon dioxide emissions, carbon neutral) is a great feat of environmental protection in China. With the deterioration of the natural environment in the world, reducing carbon emissions and alleviating global warming have become the inevitable direction of China's development in various fields, and carbon trading mechanism is the concrete way to control carbon emissions of Chinese enterprises. In this context, the field of renewable energy has ushered in a new situation of development. The low carbon emission of renewable energy is very consistent with the demand of "double carbon" and has great investment value. Based on the macro background of market changes under the carbon trading mechanism, this study explores the changes of China's renewable energy market and draws the conclusion of investment value and investment opportunity of renewable energy, with a view to providing help for China's renewable energy investment.

Keywords

Carbon Trading Mechanism; Renewable Energy; Investment Value; Investment Opportunity.

1. Introduction

The carbon trading mechanism comes from the 17th theme of Kyoto Protocol, which defines carbon emissions as a tradable quota, and countries should make a good plan for domestic energy conservation and emission reduction based on the promised emissions. For example, country A gets 10 units of carbon emission targets and country B gets 12 units of carbon emission targets, but in that year, country A's carbon emission was 8 units, and country B's carbon emission was 14 units, so country B has to buy the saved 2 units of carbon emission targets from country A by trading to ensure that its emissions are below the targets. The existence of this mechanism will lead to great changes in the energy market, and the investment value and opportunities of emerging resources such as renewable energy will change accordingly. In order to adapt to this change, all investors need to make strategic adjustments and deeply analyze the changes in the investment market in order to optimize their strategies and create greater profits.

2. Macro-background of Changes in Renewable Energy Investment Market under Carbon Trading Mechanism

The carbon trading mechanism is the supplementary content of the United Nations Framework Convention on Climate Change (UNFCCC), and it is the United Nations response to global warming. Our country highly affirmed the sustainable development value of this concept, and put it into market management in China. In 2011, China started the pilot work of carbon trading mechanism in Beijing, Tianjin, Shanghai and other cities[1]. The two-year pilot practice has proved that the model can really promote the enterprises in the pilot provinces and cities to reduce greenhouse gases and control carbon emissions[2]. Based on this experience, in 2017,

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China issued the National Carbon Emissions Trading Market Construction Plan (Power Industry), which officially pushed the carbon trading mechanism to the whole country with the power industry as a pilot, and at the end of 2020, China issued the National Carbon Emissions Trading Quota Setting and Allocation Implementation Plan (Power Generation Industry) for 2019-2020, which officially implemented the carbon trading cooperation in practice and opened the carbon trading mechanism in practical sense[3]. On July 15th, 2021, Shanghai Environment and Energy Exchange officially announced that the national carbon emissions trading will be listed in Beijing, Shanghai and Wuhan the next day, which opened the curtain of China's carbon trading mechanism. In October 2021, the Ministry of Ecology and Environment issued the Notice on Doing a Good Job in Clearing the Carbon Emission Quota in the First Performance Cycle of the National Carbon Emission Trading Market, requiring the key emission units in the power generation industry to complete the quota clearing in the first performance cycle of the national carbon market as soon as possible, so as to ensure that 95% of the key emission units in the administrative region will complete their performance before 17: 00 on December 15, 2021, and all the key emission units will complete their performance before 17: 00 on December 31. According to the information disclosed by Shanghai Environment and Energy Exchange, since November, the national carbon market has become increasingly active, with an average daily turnover of 2,644,000 tons[4]. On December 14th, the daily turnover of the market exceeded 10 million tons, reaching 14.8808 million tons, a record high since the market opened. On December 15th, 2021, the trading volume of the national carbon emission trading market exceeded 100 million tons on the 102nd trading day. By December 31st, 2021, the cumulative trading volume was 179 million tons, with a turnover of 7.661 billion yuan[5].

In this context, the market of renewable energy will get unprecedented rapid development. Take electric power enterprises as an example. Electric power enterprises consume energy to produce electricity, and carbon emissions mainly come from the energy consumption stage. Traditional power companies generally use coal as fuel for power generation, but when coal is burned, it will release a large amount of carbon dioxide, resulting in high carbon emissions of enterprises, and it is likely that they need to buy quotas in the carbon emissions trading market. This has brought huge additional economic costs to the enterprise, which has a negative impact on the operation of the enterprise[6]. Therefore, in order to control production costs and improve comprehensive income, enterprises will be more inclined to choose renewable clean energy with carbon emissions far lower than coal as the new direction of power generation, and gradually replace the existing coal power generation mechanism according to the specific conditions of enterprises. This tendency will exist for a long time because of the continuous implementation of carbon trading mechanism, which will make the renewable energy market gain long-term market vitality[7]. However, with the further development of renewable energy, many problems in its development process began to appear, such as high cost, long development cycle, low interest of investors and so on. With the introduction of carbon trading mechanism, the strong control of the country will inject strong development momentum into renewable energy, make its industry development prospects at a good level, attract more investors to join and enhance market vitality. Investment value and investment timing are the two things that investors are most concerned about. Good investment value will make huge profits from investment, and proper investment timing will maximize long-term profits. The analysis of the two can effectively improve the rationality of investment and help investors make reasonable decisions at first[8].

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3. Analysis of China's Renewable Energy Market Changes under the Carbon Trading Mechanism

3.1. The Demand for Market Scale Development is Getting Higher and Higher

In recent years, with the development of China's economy and the improvement of people's living consumption level, the level of energy consumption has increased with the gradual improvement of development level. By 2019, China has consumed a total of 4.87 billion tons of standard coal, making China the world's largest energy consumption and production country. The development of China's economy drives the development of economic markets in various industries, and the energy market is no exception. After the implementation of carbon trading mechanism, although China controls carbon emissions, its energy consumption capacity will not be greatly affected, and all industries with energy consumption demand will not have significant demand changes due to the introduction of the New Deal. Therefore, in the case of constant energy consumption demand, in order to adapt to the carbon trading mechanism, all industries must look for new energy to gradually replace the important position of coal energy in production. Based on this, the market scale development demand of renewable energy market will show a blowout state in the future, and more and more market capital will be injected into the new energy market, which will make the overall scale of the market expand sharply and show an explosive development state. At the same time, the existing huge coal market scale will lead to great difficulties in the transformation of the current energy structure. Whether the price of renewable energy can match the cost-saving needs of enterprises is still a common wait-and-see problem for all enterprises. As long as the cost of new energy can be effectively solved, the market of renewable new energy will occupy a huge share in the future energy market.

3.2. Scientific and Technological Innovation Will be the Main Direction of the Future Market

If we want to achieve the goal of energy saving and emission reduction and improve energy efficiency as soon as possible, reducing the intensity of existing energy is an inevitable link in the energy market. Only when the energy intensity becomes lower and lower, the increase of energy demand will gradually slow down, so that the carbon emissions generated by unit energy will gradually decrease. Since 2004, China's energy intensity is in a state of constant change. According to the data in China Statistical Yearbook 2020, China's energy intensity was 5.42 tons of standard coal/10,000 yuan in 2005 and 3.17 tons of standard coal/10,000 yuan in 2018. Even though the decline is already in a high state, China's current energy intensity is still 0.5 times higher than the international average energy intensity. High energy intensity is one of the important reasons for the high total energy consumption in China. If China takes effective measures to control the energy intensity below the global average, the total energy consumption in China can be greatly reduced, which may account for about half of the total energy consumption, about 1.5 billion tons of standard coal. Therefore, scientific and technological innovation has become an important content in China's renewable energy market. Only by realizing scientific and technological innovation with high application value can China upgrade and optimize the current technical level of energy development and production, thus promoting the decline of energy intensity in China. Simple changes in consumption and production structure can't provide the fundamental motive force for peak carbon dioxide emissions's goal. Scientific and technological innovation is the fundamental way to reduce energy intensity and control carbon emissions, and scientific and technological innovation should be placed in the primary position in the development of renewable energy market.

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3.3. The Renewable Energy Market is Developing in a Diversified Direction.

Before the carbon trading mechanism and the goal of "double carbon" appeared, China's energy structure was not much different from that of ordinary developing countries, and coal was the main energy source, accounting for more than 50% of the national energy structure. After peak carbon dioxide emissions and the goal of carbon neutrality appeared, it is no longer the task of the energy industry to control carbon emissions and optimize the energy structure, but also the common responsibility of all kinds of industries related to production in the whole society. Reducing the proportion of coal in the energy market and increasing the market share of renewable energy will not happen overnight. It is necessary for all industries to continuously deepen energy transformation and improve energy structure. According to the data in China Statistical Yearbook 2020, the proportion of coal consumption in China's total energy consumption in the past fifteen years is in a continuous downward trend. In 2007, coal consumption accounted for 72.5% of China's total energy consumption. After more than ten years of progress and development, the proportion of coal consumption in China has dropped to 57.7% in 2019. However, compared with the world energy development level and the goal of "double carbon", China's total carbon emissions are still at a high level and need to be further controlled. In order to meet this development demand, China began to vigorously develop the new energy market. Today, the proportion of non-fossil energy in China's energy market has further increased, reaching 15.3% at the end of 2019, making it an important energy source after coal and oil. In addition to natural gas, a non-renewable and non-fossil energy source, energy sources such as hydrokinetic energy, nuclear energy, wind energy, geothermal energy, tidal energy and biomass energy have gradually increased their market share, making the energy market generally diversified. At present, the installed capacity of hydropower, wind power, photovoltaic and nuclear power under construction in China is in the first place in the world. After several years of optimization and adjustment, the wind and solar power generation equipment and technology have reached the state of being connected to the power grid at a low price.

4. Analysis of Investment Value and Investment Opportunity of Renewable Energy under Carbon Trading Mechanism

4.1. Analysis of Investment Value

(1) incremental assets

In the new era, renewable energy is facing bright development prospects, and investing in this field may yield great benefits in the near future. From the point of view of short-term interests, renewable energy operation projects can obtain additional income as operating assets because of the existence of carbon trading mechanism, which leads to the increase of market assets value. In the long run, renewable energy will become the main force in peak carbon dioxide emissions and carbon neutrality in the future, and the market scale of power generation by renewable energy will be in a state of rapid development in the future, which will become an important driving force to achieve the goal of double carbon. Its asset value will also gradually increase with the decrease of energy intensity in China, and at the same time, it will show its energy value and environmental protection value. Relevant data show that by the end of 2020, China's renewable energy power generation installed capacity reached 934 million kilowatts, including 281 million kilowatts of wind power and 253 million kilowatts of photovoltaic power generation. During the "14th Five-Year Plan" period, China will vigorously accelerate the development of non-fossil energy such as wind power and solar power generation, and continuously expand the supply of green and low-carbon energy. Wind power photovoltaic will become the main force of clean energy growth. It is estimated that by 2025, the total installed capacity of renewable energy in China will exceed 1.4 billion kilowatts, including 400 million

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kilowatts of wind power and 500 million kilowatts of photovoltaic power generation. Moreover, with the continuous development of China's scientific and technological innovation level, the power generation technologies of photovoltaic power generation and wind power generation have been continuously improved, and the cost has been declining. Now they can reach the parity level and have the basic conditions for wide-scale promotion and use. The absorption technology of solar energy and wind energy has been fundamentally improved, the power generation cost has been further reduced, and the power generation income has been further improved. On this basis, the renewable energy market is bound to face further transformation, and the yield of new energy power generation projects will gradually increase, with high investment value.

(2)Stock of assets

Asset value refers to the exact assets owned by enterprises, and whether the existing assets of renewable energy industry will be revitalized due to the introduction of the New Deal is also an important embodiment of investment value. As far as the current development status of renewable energy enterprises is concerned, the financial status still has a heavy burden. China's renewable energy industry was driven by typical industrial policies in the early stage of development. By collecting additional subsidy funds for renewable energy electricity prices from the terminal sales price, new energy projects were given higher on-grid electricity prices than coal-fired electricity. In the era of subsidies, the benchmark feed-in tariff of new energy power generation projects includes two parts, namely, the benchmark feed-in tariff of local coal-fired units and renewable energy power generation subsidies. The part of the on-grid price of photovoltaic power generation and onshore wind power within the benchmark on-grid price of local coal-fired units shall be settled by the local provincial power grid on a monthly basis; The higher part is subsidized by the National Renewable Energy Development Fund and distributed according to the priority determined by relevant departments. In June 2012, the Ministry of Finance, the National Development and Reform Commission and the National Energy Administration issued the first batch of renewable energy tariff subsidies, and in the following six years, seven batches of renewable energy tariff subsidies were issued. With the substantial increase in the installed capacity of photovoltaic and wind power and subsidy funds, the subsidy gap of renewable energy continues to expand. According to incomplete statistics, by the end of 2020, the arrears of subsidies included in the subsidy catalogue and not included in the subsidy catalogue may have exceeded 300 billion yuan. Because the subsidy cannot be paid to the account of the renewable energy power generation enterprise in time, the enterprise is under great economic pressure, and the refinancing ability and investment willingness are greatly reduced, which limits the development of the enterprise. In order to promote the healthy and stable development of non-water renewable energy power generation, the state has introduced a series of measures to fully implement green power certificate trading; Simplify the management of the catalogue system, and the state will no longer publish additional catalogues of renewable energy electricity prices. All renewable energy projects shall fill in the additional application information of electricity price through the national renewable energy information management platform, and the grid enterprises shall determine and regularly publish the list of eligible renewable energy power generation subsidy projects; Encourage financial institutions to rationally arrange the scale of credit funds for power generation projects that meet the planning and are included in the subsidy list according to the principle of marketization, effectively solve the financing problem of enterprises' compliance with new energy projects, and promote the asset securitization process of power generation projects that have been included in the subsidy list. The impact of subsidy closure on renewable energy operators will continue to narrow. With the gradual settlement of subsidy arrears, the capital of new development projects, the flexibility of early repayment of debts and the dividend ratio of the company are expected to be improved, and the investment value will be further explored.

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4.2. Investment Opportunity Analysis

(1)Ecological civilization

The construction of ecological civilization is an important part of the "five in one" overall layout and "four comprehensive" strategic layout of Socialism with Chinese characteristics in the new era in China, and it is a direction that will surely last for a long time and develop in depth in the current era. After the introduction of the "double carbon" policy, the construction of ecological civilization has been greatly promoted. Carbon trading mechanism, peak carbon dioxide emissions and carbon neutrality have become the important directions for the future development of ecological civilization in China, and are the core indicators for the green development of China's industries. It can be seen that ecological civilization and economic development will be closely integrated in the future and become the main form of economic development in the future. The emergence of carbon trading mechanism makes China's low-carbon development strategy finally fall to the practical level. For example, a region in China once divided half of the region into projects that did not allow the construction of traditional polluting power generation systems to protect the ecological environment of the region. In this case, renewable energy projects have unique advantages, and their environmental protection properties can generate electricity under the condition of ensuring the regional ecological environment, which has high application value. Therefore, under the background that the country vigorously promotes the construction of ecological civilization, investing in renewable energy projects will get good returns, which is a good opportunity for investment.

(2)Digital economy

With the rapid development of big data technology and artificial intelligence technology, the era of digital economy has arrived. The era of digital economy provides new opportunities for the development of various fields, and the renewable energy industry is no exception. In the new era, in order to control carbon emissions and practice carbon trading mechanism, renewable energy enterprises will strive to optimize production structure and production technology, and digital economic environment and digital technology will play an important role. The essence of digital economy is to simplify the data with high complexity and diverse digital structures into models, and optimize the decision-making effect according to the form of computer processing data, so as to adopt more reasonable schemes in practice. With the gradual maturity of digital technology, big data algorithm and cloud computing technology can further optimize various data of renewable energy enterprises, such as user file management, electricity consumption data management, production capacity management and employee salary management, and key data such as carbon emissions will also be monitored by big data management system, making it easier for enterprise managers to understand the causes of carbon emissions data at each moment, and to analyze the causes of excessive carbon emissions according to data processing results, continuously optimize energy structure and business model, and pursue better development prospects. Moreover, in the stage of renewable resources exploitation, big data technology and artificial intelligence technology can also continuously optimize production methods through their super computing power, and improve the efficiency of enterprises in exploiting renewable energy. The advent of the digital economy era will help renewable energy enterprises to further optimize their production processes, realize digital processing of the whole process, accurately measure carbon emissions, and provide technical support for enterprises to promote carbon trading. The introduction of the dual-carbon policy will greatly promote the development of digital economy, further develop China's digital technology, promote the application of emerging technologies such as industrial robots in renewable energy enterprises, and further develop the productivity of renewable energy enterprises. In this case, the digital economy and renewable energy will have a coupling effect and promote each other's development, which has good investment value.

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5. Concluding Remarks

With the approaching of the climate crisis, the control of carbon emissions must be put on the agenda. As a low-carbon energy or zero-carbon energy, renewable energy is the main force to control carbon emissions in the future. Under this premise, renewable energy will become a key industry with great development potential in the future and achieve rapid development. Therefore, the renewable energy industry will become a hot investment field in the future. The support of government policies, the dividend of industry development and the development of emerging technologies will inject new energy into this field and promote its development in the direction of future major energy sources. In the era of digital economy, renewable energy will be even more powerful, which will become an important help for the win-win situation of environmental protection and economic development in China in the future.

References

[1] Alvarenga, C.A., Costa, D., Lobo, A.R., 1996. Renewable sources for decentralized energy supply. Renewable Energy 9, 1152-1155.

[2] Comair, F., 2008. RENEWABLE ENERGY PROFILE FOR LEBANON, NATO Advanced Research Workshop on Enhancing Security in the Middle East Through Regional Cooperation on Renewable Energy, London, ENGLAND, pp. 55-70.

[3] Corkish, R., Barnett, A., Bremner, S., Bruce, A., Kay, M., Lennon, A., Perez-Wurfl, I., Sproul, A., Stapleton, G., Shrestha, S., Spooner, E., Taylor, R., Uddin, A., Wentworth, D., 2012. RENEWABLE ENERGY EDUCATION AT UNSW. Journal of Materials Education 34, 117-131.

[4] Kayed, A., 2013. Renewable Energy Ontology, 1st International Conference and Exhibition on the Applications of Information Technology to Renewable Energy Processes and Systems (IT-DREPS), Univ Petra, Amman, JORDAN, pp. 144-148.

[5] Olabi, A.G., Abdelkareem, M.A., 2022. Renewable energy and climate change. Renew Sust Energ Rev 158.

[6] Pablo-Romero, M.P., Sanchez-Braza, A., Romero, M.G.P., 2022. Renewable energy in Latin America. Aims Energy 10, 695-717.

[7] Petinrin, J.O., Shaaban, M., 2015. Renewable energy for continuous energy sustainability in Malaysia. Renew Sust Energ Rev 50, 967-981.

[8] Upton, G.B., Snyder, B.F., 2017. Funding renewable energy: An analysis of renewable portfolio standards. Energy Economics 66, 205-216.