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Thoughts on Promoting Carbon Sink Trading in Zhuzhou City under the Background of Urban Integration

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Abstract: Carbon sequestration trading, as an important market mechanism to address global climate change, is based on the provisions of the United Nations Framework Convention on Climate Change and the Kyoto Protocol. It aims to promote the stability of the global ecological environment by verifying and constraining greenhouse gas emissions. This paper discusses the basic background, practical value, and trading methods of carbon sequestration trading, and puts forward strategies and suggestions for promoting carbon sequestration trading in Zhuzhou City based on its actual situation. Carbon sequestration trading not only promotes sustainable development but also facilitates the compensation of ecological value, providing strong support for the realization of China's dual carbon goals. Through the research in this paper, the author hopes to provide a reference for the practice of carbon sequestration trading in Zhuzhou City and even the whole country.

Keywords: Carbon sequestration trading; Sustainable development; Ecological restoration; Practical value; Zhuzhou City

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1. Introduction

As global climate change becomes increasingly severe, carbon sink trading, as an innovative market mechanism, plays a significant role in promoting emission reduction and achieving sustainable development [1–3]. As an important city in Hunan Province, Zhuzhou faces the urgent task of realizing its dual carbon goals. This paper aims to explore the basic background, practical value, and trading methods of carbon sink trading, and in light of Zhuzhous actual situation, propose strategies and suggestions for advancing carbon sink trading, providing a reference for Zhuzhous green development.

2. Basic background of carbon sink trading

In 2020, the Chinese government set a goal that "China's carbon dioxide emissions aim to peak by 2030 and strive to achieve carbon neutrality by 2060" [4]. This goal not only demonstrates China's firm commitment to global climate governance but also provides important policy guidance for the development of China's carbon trading.

Since 2020, the Chinese government has introduced a series of policy documents on carbon peak and carbon neutrality. It has explicitly proposed to rely on public resource trading platforms to accelerate the construction and improvement of the national carbon emission trading market, incorporate carbon sink trading into it, and establish and improve an ecological compensation mechanism that can reflect the value of carbon sinks.

Hunan Province has also actively responded to the national call, introducing a series of relevant policy documents. It proposes to optimize the regional layout for green and low-carbon development, support the Chang-Zhu-Tan urban agglomeration and other places with conditions to take the lead in reaching peak carbon emissions, and actively participate in the formulation of national standards for carbon accounting and carbon trading.

Zhuzhou City, an important city in Hunan Province, has actively responded to the policy guidance of the state and province by issuing the "Zhuzhou City Carbon Peak Implementation Plan." The plan focuses on promoting carbon peak actions through low-carbon industrial development and green energy transformation, clearly outlining the timeline, roadmap, and implementation plan for achieving peak carbon emissions. Additionally, Zhuzhou City is actively exploring development paths for carbon trading based on local conditions.

3. The practical value of carbon sink trading to Zhuzhou city

Promoting energy conservation and emission reduction. Carbon trading incentivizes companies to reduce carbon emissions and lower production costs through market mechanisms, thereby encouraging greater investment in carbon reduction and technological innovation. In the carbon emission trading system, high-energy-consuming, highly polluting, and high-emission companies are assigned initial emission reduction responsibilities. Companies that exceed their quotas must purchase additional emission rights on the carbon trading platform, while those that reduce emissions can earn economic returns by selling surplus emission allowances. This mechanism effectively promotes energy conservation and emission reduction among enterprises.

Achieve ecological value compensation. Carbon trading compensates for ecological value by converting ecological resources into quantifiable and tradable assets [5]. Through carbon trading, more countries, enterprises, and organizations can be encouraged to adopt emission reduction measures, increase carbon sinks, and thereby mitigate the impact of climate change. This not only helps protect the environment but also promotes harmonious coexistence between the economy and the ecosystem. Zhuzhou City has abundant forest resources, and by developing forestry carbon sink projects, it can maximize the value of these ecological resources.

Provide financing support. Carbon trading provides long-term, low-cost financial support for green and low-carbon projects [6]. Through models such as "carbon sink + fund", "carbon sink + pledge loan", and "carbon sink + insurance", carbon trading facilitates the flow of funds and asset activation, offering strong support for the development of green and low-carbon projects. Zhuzhou City can draw on these models to promote the deep integration of carbon trading with financial services.

Helping farmers increase their incomes. Carbon trading can also help farmers increase their income. By developing forest rights or self-retained mountains of registered poor villages and households in the national poverty alleviation information system into poverty alleviation carbon projects, ecological compensation can be obtained, which

is specifically used to support income growth for registered poor households and subsequent poverty alleviation efforts such as public infrastructure in poor villages [7]. Zhuzhou City can explore this model, combining carbon trading with rural revitalization to achieve a win-win situation for both ecological and economic benefits.

4. Methods of carbon sink trading

Transaction process. Carbon sink trading is mainly based on the Measures for the Administration of Carbon Emission Trading (Trial) issued by the Ministry of Ecology and Environment and the Notice on the Pilot Work of Carbon Emission Trading issued by the National Development and Reform Commission. The specific process and mechanism mainly include the following six steps. Project design: clarify the afforestation site, tree species selection, afforestation area, etc., and formulate detailed management measures. Feasibility study: to evaluate the technical, economic, and social feasibility of the project. Project approval: evaluate the environmental impact, socio-economic impact, and other aspects of the project to ensure that the project complies with relevant standards and regulations. Carbon sink measurement and monitoring: regular monitoring and measurement of carbon sinks in forests, grasslands, wetlands, and other ecosystems by professional institutions [8]. Trading process: Trading in the carbon market, where buyers buy carbon emission targets to offset their own emissions reduction obligations [9–10]. Third-party certification and registration: to ensure the legitimacy and transparency of transactions, third-party institutions will audit and certify carbon sink projects.

Taking the development of forestry carbon sink projects as an example, the development process of CCER (China Certified Emission Reduction) forestry carbon sink projects can be summarized into 7 steps: project design, project approval, project filing, project implementation, project monitoring, emission reduction certification, and its filing and issuance. After the development of the project, there are mainly two trading methods. Main trading methods: After the project forestry carbon sink CCER is registered and issued by the National Development and Reform Commission, it will be traded on the carbon exchange registered by the National Development and Reform Commission for key emission units (emission control units) to fulfill their obligations or relevant organizations to carry out voluntary emission reduction, fulfill their social responsibilities, etc., such as carbon neutrality and carbon compensation. Other transaction methods: After registration, the project owner and the buyer sign an order agreement and pay a deposit or advance payment. The buyer is delivered forestry carbon sink CCER after each emission reduction issued by the competent national authorities.

5. Strategies and suggestions for promoting carbon sink trading in Zhuzhou City

5.1. Find out the number of carbon sink projects and promote their development

Zhuzhou City should focus on the problem of “how to generate” carbon sink, find out the bottom line, and promote the development of carbon sink projects.

5.1.1. Development of ecological business carbon sink projects

For existing forest land, develop business forestry carbon sink projects through measures such as transformation and quality improvement, purchase and stop logging of commercial forests in key ecological areas, and pest and disease control.

5.1.2. Developing afforestation carbon sink projects

Increase the intensity of support policies, actively seek financial and policy project support from higher authorities, and seize market opportunities. During the 14th Five-Year Plan period, plan to add new afforestation and forest tending projects, encouraging state-owned forest farms, forestry enterprises, and other business entities to strengthen forest management, improve forest quality, enhance the carbon sequestration capacity of forest ecosystems, and lay a solid foundation for carbon sink transactions.

5.1.3. Develop clean energy

Increase the development and utilization of clean energy such as hydropower and solar energy, and increase the proportion of clean energy in carbon sink trading. For example, Chaling Tao Shui Reservoir and Youxian Jiubujiang Reservoir can be used as high-quality carbon sink projects.

5.2. Broaden channels and stimulate the vitality of market entities

Zhuzhou City should focus on the problem of how carbon sink circulation, broaden the trading channels, and stimulate the vitality of market entities.

5.2.1. Expand the trading scope

Strive to make national and provincial carbon allowances, as well as nationally certified voluntary emission reductions, the main trading products in Zhuzhou's carbon market. Allow key emission units and social organizations to purchase these for offsetting emissions. Broaden the entities eligible for forestry carbon sink development and trading to independent legal persons, and increase the carbon offset limit to 10%, further boosting trading demand.

5.2.2. Standardize trading procedures

Encourage local governments to actively explore off-exchange trading models for forestry carbon sinks, cultivate institutions with certification qualifications for forestry carbon sink projects, and train a group of professionals related to forestry carbon sinks to participate in national carbon sink trading.

5.2.3. Connecting with external markets

Encourage cooperation with investment companies to develop forest carbon sink projects and trade them on the carbon trading platform, actively participate in the construction of the national carbon market registration and trading system, strive to amplify the demonstration effect of carbon sink trading, and actively benchmark against international carbon sink development rules.

5.3. Innovate models to promote diversified carbon sink finance

Zhuzhou City should focus on the problem of "how to apply" carbon sink, innovate the model, and promote the development of diversified carbon sink finance.

5.3.1. Smooth carbon sink loan financing

Develop carbon sink projects in existing large forest farms, establish forestry financing guarantee companies, and set up forest ecological operation centers to secure long-term loans from state-owned banks. By leveraging market mechanisms, guide bank financial capital and social capital into carbon sink projects, injecting sustained internal momentum for green and low-carbon development.

5.3.2. Developing carbon sink financial products

Based on the increase in forest growth volume, convert it into carbon reduction through measurement methods. Monitor and calculate via third-party institutions, review by experts, approval by forestry authorities, and record-filing by environmental protection departments. Issue "forest tickets" to forest owners, turning these "forest tickets" into tradable, storable, and loanable assets.

5.3.3. Exploring the practice of "carbon sink + rural revitalization"

Targeting carbon sink forests in mountainous rural areas with relatively lagging economic development, this initiative encourages enterprises, organizations, and individuals to subscribe to carbon funds and participate in afforestation, forest management, and protection projects. Integrating government investment with social donations promotes the development of carbon sink projects, achieving increased efficiency and returns. Scientifically measuring carbon sink volumes and selling them at a price of "one yuan per 100 kilograms," subscription fees are deposited into a dedicated account for increasing income in agriculture, forestry, and village collectives. This allows rural areas to share in the benefits of development, thereby consolidating poverty alleviation achievements and vigorously advancing rural revitalization.

6. Conclusions

Carbon trading, as an effective market mechanism for addressing global climate change, has significant advantages in promoting sustainable development and achieving ecological value compensation. As an important city in Hunan Province, Zhuzhou should actively respond to national and provincial policy guidance, combine local realities, plan ahead, and take proactive steps to advance the development of carbon trading. By clarifying the baseline, broadening channels, and innovating models, Zhuzhou can fully leverage the role of carbon trading in energy conservation, emission reduction, realization of ecological product value, financing support, and increased income for farmers, contributing to the achievement of dual carbon goals and promoting green development.

Disclosure statement

The author declares no conflict of interest.

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