Improving the "Dual Carbon" Issues Based on the Theory of "Degrowth Eco-Socialism"

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Abstract. By 2025, China has achieved its initial "dual carbon" goals. However, due to differences in local understanding of policies and constraints of regional economic conditions, the effectiveness of achieving "dual carbon" goals is not comprehensive in some areas. Some regions still rely heavily on traditional fossil energy, while others face problems such as insufficient capital investment, inadequate policy implementation, and imperfect market incentive mechanisms. These issues will directly affect the progress and effectiveness of achieving the overall "dual carbon" goals. Therefore, this study adopts the literature research method. Through the interpretation of relevant literature, it aims to empower the better achievement of "dual carbon" goals with the theory of "degrowth eco-socialism". Research shows that the theory of degrowth eco-socialism is consistent with the direction, implementation paths, and goals of The Opinions of the Central Committee of the Communist Party of China and the State Council on Fully, Accurately and Comprehensively Implementing the New Development Concept and Doing a Good Job in Carbon Peaking and Carbon Neutrality Work (hereinafter referred to as The Opinions). Thus, in the process of realizing the goals of The Opinions, Kozo Saito's theory of "degrowth eco-socialism" can be effectively learned from and integrated, thereby providing new ideas and directions for the better achievement of the "dual carbon" goals.

Keywords: Carbon Peaking; Carbon Neutrality; Degrowth Eco-Socialism; Integration.

1. Introduction

At present, worldwide carbon emissions exhibit several properties: the total volume keeps increasing, but the growth rate decreases, the regional patterns are highly diversified, and factors driving them become more complicated. This indicates the complexity and urgency of global climate governance. In 2023, the world carbon dioxide emissions in energy activities were at an all-time high of 37.4 billion tons. The total emissions continue to have a positive relationship with economic development, even though the growth rate has slowed to 1.1 in the year 2023 compared to 1.3 in 2022, and since the Industrial Revolution, the total emissions have grown three times [1]. In 2024, the atmospheric carbon dioxide level again increased to 423.9 ppm, and the rate of increase, at 3.5 ppm/year, was the highest since the 1957 level of 40.3 ppm, meaning that the burden on the carbon cycle system is only increasing [2]. Meanwhile, the pattern of regional emissions is also very differentiated. The developing countries have turned into the primary cause of the emission growth: the energy-related emissions of these countries have grown by 20.66 between 2013 and 2023, and their share of the global emissions has risen to 68.38, whereas it was 60.88. At the same time, developed countries reduced their emissions by 13.16. These statistics indicate the regionalism of the process of world industrialization. China, being the largest emitter, emitted 12.6 billion tons in 2023 (equivalent to 34 percent of the global level), then United States (13 percent) and India (7 percent). The three big economies combined are the biggest contributors of carbon emissions worldwide related to energy [3]. Over the last few years, common wildfires due to extreme weather shifts like El Niino, combined with the reduction of the carbon absorbing ability of the ecosystem, have resulted in a two-way strain of rising emissions and reduced absorption. Though due to the advancement of clean energy technologies, the emission reduction effect has already started, overcoming the increase in the emissions of the old-fashion energy to some extent, the present critical condition of the global carbon emissions is not promising [4]. China being a responsible major country, must take initiative in the international emission reduction work and collaborate with the other countries of the world in which

to facilitate the development of several areas including control of consumption in fossil fuels, mitigate climate feedback and speed up energy transition.

The Opinions are the objectives and goals that China has been making and advancing which is a significant act of discharging international duties and exhibiting great-country responsibilities. China is at a high-quality economic development crisis stage as far as domestic development is concerned. The classical model of development with high energy consumption and high emissions is no longer sustainable. This policy assists in encouraging industrial structure readjustment and energy transition, the comprehensive green and low-carbon development of economy and society, and the positive interaction between the ecological environmental protection and the economic development. As it makes the ecological environment better, it increases the feeling of profit, joy, and safety in people. The Opinions is a guiding document in advancing the so-called dual carbon work and offers a clear way in the attainment of the so-called dual carbon goals. It does not only make clear the general requirements and overall goals but also provides detailed preparation of key tasks, including most areas of energy, industry, transport, and construction. By carefully examining the contents of The Opinions, the strategic map and direction of action of China in the process of achieving the aims of the "dual carbon" can be more clearly comprehended, and the role and applicability of the theory of “degrowth eco-socialism" in helping to achieve the goals further demonstrated. The two are mutually benefiting, as they work together to ensure the continued development of China in terms of global climate governance and to add Chinese wisdom and strength to the process of establishing a community with a common future to mankind. This paper undertakes extensive research in applicable policy documents using the literature research methodology, but concentrating on the progress of the Chinese goals of a dual carbon. The central questions are to investigate the ways China can achieve the positive outcomes of the dual carbon effectively, and the functions and practical implications of the related policies and theories in this direction.

2. Policy Research

2.1. Policy Subject

On September 22, 2021, the Party Central Committee and the State Council issued The Opinions of the Central Committee of the Communist Party of China and the State Council on Fully, Accurately and Comprehensively Implementing the New Development Concept and Doing a Good Job in Carbon Peaking and Carbon Neutrality Work (hereinafter referred to as "The Opinions") to achieve the goals of carbon peaking and carbon neutrality. As a top-level design, The Opinions, together with supporting documents such as the Action Plan for Carbon Peaking Before 2030, has made systematic arrangements for the goals of carbon peaking and carbon neutrality, clarified the guiding ideology, work principles, and phased objectives, and provided fundamental guidelines for relevant work [5].

The Opinions incorporates carbon peaking and carbon neutrality into the overall economic and social development, takes the comprehensive green transformation of economic and social development as the guide, takes the green and low-carbon development of energy as the key, and unswervingly takes the path of high-quality development that prioritizes ecology and is green and low-carbon [6]. To achieve the goals of carbon peaking and carbon neutrality, five principles must be adhered to: nationwide coordination, prioritizing conservation, dual-drive (technological innovation and institutional reform), internal and external connectivity, and risk prevention [7].

2.2. Policy Objects

The objects of The Opinions include six groups: Party and government organs at all levels and leading cadres, local governments and relevant departments, enterprises and the industrial sector, scientific research institutions and technical personnel, the general public and consumers, as well as the international community and cooperative partners [8].

Different objects assume distinct responsibilities under The Opinions: Party and government organs are responsible for top-level design and supervision; local governments formulate plans based

on local conditions; enterprises transform through technological innovation; researchers break through technical bottlenecks; the public practices a low-carbon lifestyle; and the international community participates in cooperation. The policy clarifies specific goals for 2025, 2030, and 2060, covering areas such as the economic system, energy consumption, carbon emissions, energy consumption structure, and forest coverage rate.

In the context of the realization of the 2025 objectives, the energy system has been optimized continuously: the share of non-fossil energy use is near the target, the share of coal use has been reduced, and the renewable energy capacity installed has surpassed the planned one in the future. There has been improvement in energy efficiency and emission reduction and the drop in energy consumption/unit of GDP and carbon dioxide emissions are in line with national determined contribution targets. Policy and market processes are enhanced: the carbon market has already demonstrated impressive outcomes, accompanied by a greater number of industries under the enhanced institution system, a carbon emission accounting standard system is in place. The dual carbon goals are also influenced by the theory of the so-called degrowth eco-socialism. In the energy sector, it supports the idea of lessening the usage of fossil energy, advancing the energy framework toward cleanliness and renewability, cutting down on distributed energy structures as well as motivating individuals and communities to engage in energy generation. Regarding the consumption, it advances simple, moderate, green, and low-carbon lifestyle, increases the environmental awareness of the population, and stresses the role of social equity in the reduction of emissions. It suggests incentive and restraint measures in institutional building and policy advising, like carbon taxes and carbon emission trading markets; governments offer preferential policies like money subsidies, draw up environmental protection acts and regulations and enhance international collaboration to engage together in the realization of the duo carbon goals.

2.3. Policy Goals

The main goals of The Opinions are as follows: By 2025: Establish a green and low-carbon economic system; reduce energy consumption per unit of GDP and carbon dioxide emissions by 13.5% and 18% respectively; increase the proportion of non-fossil energy consumption to 20%; raise the forest coverage rate to 24.1% and the forest stock volume to 18 billion cubic meters, laying a foundation for carbon peaking and carbon neutrality. By 2030: Achieve significant progress in the green transformation of the economy and society; substantially reduce energy consumption per unit of GDP; cut carbon dioxide emissions by more than 65% compared with the 2005 level; increase the proportion of non-fossil energy consumption to 25%; expand the installed capacity of wind and solar power to over 1.2 billion kilowatts; raise the forest coverage rate to 25% and the forest stock volume to 19 billion cubic meters; and achieve the peak of carbon dioxide emissions and maintain a steady decline thereafter. By 2060: Build a green and low-carbon economic and energy system; increase the proportion of non-fossil energy consumption to over 80%; achieve carbon neutrality; and create a new realm of harmonious coexistence between humans and nature [9].

3. Achievement of the 2025 Goals

According to information released by authoritative departments such as the National Development and Reform Commission and the National Energy Administration, China has made remarkable progress in advancing carbon peaking and carbon neutrality. Many 2025 goals have been achieved ahead of schedule or as planned.

3.1. Energy Structure

About 20 percent is set as the ratio of non-fossil energy consumption in The Opinions in terms of maximizing the energy structure. As a matter of fact, this percentage has already increased to 19.8% (2024 data), and even the target of 2025 will be higher. The coal consumption ratio has decreased to 53.2% in 2024 as compared to 56.8 in 2020, whereas the ratio of non-fossil energy consumption has

risen to 19.8 in 2024 compared to 15.9 percent in 2020. China, the largest exporter and investor of clean energy in the world, has also contributed immensely to the reduction of carbon emissions and green transformation worldwide [10].

3.2. Energy Efficiency and Emission Reduction

On energy saving and reduction of emissions, the 2025 target on energy consumption by per unit of GDP is a reduction of 13.5% over 2020. The real advancement is satisfactory and energy efficiency in major industries is still increasing. It has a goal of reducing its carbon dioxide emissions by 18 percent of the 2020 level, and a decline in the rate of carbon intensity is also part of the targets of the nationally determined contribution of carbon dioxide emissions in 2030 [11]. Liu Hongxun, Yang Jingnan, and Gao Jinfeng came to the conclusion that China can reach the carbon peaking and carbon neutrality target by 2030 and 2060 based on the construction of a three-dimensional panel data on the regions, industries, and time. In the meantime, by the dual approaches of output and total factor productivity, they confirmed the Porter Hypothesis, which says that win-win development can be achieved through optimal emission reduction paths [12]. Ding Yuying and Gao Zhigang used the panel data of 30 Chinese provinces between 2000 and 2019 to demonstrate an inverted U-shaped relationship between industrial agglomeration and carbon emissions. In particular, the association between industrial agglomeration and the carbon emission in the eastern and central regions are consistent with the base results and the central regions have surpassed the inflexion point of carbon emission earlier than the eastern ones and so they have got positive carbon emission reduction effects. Simultaneously, the negative correlation between industrial agglomeration and carbon emissions is high in the western regions. Further confirmations have indicated that energy efficiency is a significant mediating factor in the relationship between industrial agglomeration and carbon emission. In order to make the realization of the "dual carbon" objectives a reality, industrial arrangement has to be maximized, the carbon emission reduction value of industrial agglomeration will have to be fully utilized, and the scientific energy policies will have to be developed to orderly develop the energy sector [13].

3.3. Policies and Market Mechanisms

In terms of policies and market mechanisms, remarkable progress has been made in the construction of the carbon market. China’s national carbon emission trading market has expanded to new sectors such as steel and cement, with its institutional system further improved, effectively promoting low-cost emission reduction. In terms of the standard and measurement system, a carbon emission accounting standard system covering enterprises, projects, and products has been established, supporting the operation of the carbon market and the achievement of "dual carbon" goals. Based on relevant data of pilot enterprises from 2005 to 2019, Wang Jing and Cai Peifeng conducted an empirical test on the theoretical mechanism using the multi-period propensity score matching difference-in-differences (PSM-DID) model. The research results show that carbon emission trading (CET) has significantly reduced the labor demand of pilot enterprises. Mechanism analysis indicates that the inhibitory effect of CET on labor demand is driven by the synergistic effects of technological transformation. Among them, the scale effect and productivity effect of technological transformation help promote employment, while the factor substitution effect inhibits employment—and the intensity of the former is weaker than that of the latter. In addition, the impact of CET on labor demand shows time-varying characteristics: during 2013-2019, labor demand first showed a downward trend and then recovered. CET has a job-destroying effect on polluting enterprises and low-skilled labor, while it has a job-creating effect on clean enterprises and high-skilled labor [14].

To conclude, China has achieved a breakthrough development in energy transition, energy efficiency enhancement, and the construction of policy mechanisms, which forms a strong background of carbon peaking before 2030. Such successes show not only the will and activity of China in dealing with climate change but also the Chinese wisdom and solutions in world climate management.

4. Optimization Suggestions Based on the Theory of Degrowth Eco-Socialism

4.1. Energy Sector

The theory of "degrowth eco-socialism" makes it clear, in the energy sector, that over-dependence on fossil energy must be diminished over time, and that an overhaul of the very nature of the energy system in favor of cleaner, more renewable power sources should be actively encouraged. The theory underlines that renewable energy (solar, wind, hydropower, and other sources) should be actively stimulated; with the help of the technologic advancement and the state policy, the percentage of the traditional fossil sources of energy (coal and oil) in the general system of energy production should be diminished with time. Particular action steps include setting up distributed energy systems, which are capable of enhancing the efficiency of energy use, and minimising the unnecessary losses during energy transmission and distribution [15]. Furthermore, the theory promotes the active involvement of individuals and localities in energy generation and the creation of a self-reliant energy system to lessen over-dependence on giant energy companies. Through this, a cascade of environmental and social issues brought about by energy monopoly and over-exploitation can be mitigated successfully, achieving sustainable development of energy and harmony and stability of society [16].

4.2. Consumption Patterns

Regarding consumption patterns, the theory of the so-called degrowth eco-socialism promotes a low-carbon, green, moderate and simple lifestyle. It promotes the idea of individuals questioning and adjusting overconsumption and waste actions. The awareness of the population about the environment can be increased by means of education and publicity: citizens are encouraged to use more environmentally friendly products, use fewer disposable things, and propagate the idea of a circular economy. This will help decrease the energy use and carbon emissions in everyday life. Moreover, the theory also lays stress on social equity in the emission reduction process. It guarantees that various regions and categories are able to contribute responsibilities of emission reduction equitably and enjoy the fruits of green development. Reasonable policies and measures can help avoid new social inequalities that may be caused by the emission reduction actions, protect the rights and interests of vulnerable groups, and facilitate social harmony and stability [17].

4.3. Institutional Construction and Policy Guidance

The concept of degrowth eco-socialism views institutional construction and policy direction–critically. It suggests the establishment of a round of incentives and restraint measures, including carbon taxes and carbon emission trading markets, to make enterprises and individuals engage in reducing emissions at an active level through economic incentives. Carbon emission trading market is a market-based mechanism to regulate carbon emission: in the market, it is possible to buy and sell carbon emission rights in a specific quota, which will encourage the technological innovation of the enterprise to reduce emissions and it has an extra economic benefit to the enterprise that can successfully reduce carbon emissions [18].

Moreover, the governments can provide special policies that include financial subsidies, and tax exemptions to motivate the enterprises to invest in green technologies and renewable energy projects. Meanwhile, they should also develop strict environmental protection laws and standards to punish enterprises that cause serious pollution to create a powerful restraint mechanism. With the help of these extensive measures, it is possible to successfully steer social resources in the direction of the low-carbon economy that contributes to the optimization and modernization of the industrial complex.

Cooperation among countries is necessary as well. The United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement are some of the platforms where the world can collaborate. Regular international conferences and negotiations allow countries to establish the goals of emission reduction together, oversee and monitor the progress, and make global emission reduction activities transparent and effective [19]. In brief, the realization of the objectives of the dual carbon

is a systematic project, which involves the collaboration between governments, enterprises, the population, and other parties.

5. Discussion

Nonetheless, there are a number of limitations to the existing research. On the one hand, it does not provide an examination of the challenges and issues of the implementation of The Opinions. In the implementation of policies, various regions have challenges because of the differences in resources and economic basis. Other bottlenecks that may be faced by enterprises may include lack of funds and talent in technological innovation and industrial upgrading, yet the research does not address these circumstances. Secondly, it does not list the drawbacks of the theory of degrowth eco-socialism in the practical application in China. It is suggested by a particular social background and it may not be entirely applicable to the national conditions of China and this may even introduce some problems yet the study does not examine that. Thirdly, it fails to evaluate the unpredictable variables that influence the realization of the "dual carbon" goals in the future. The international political and economic situation changes, the uncertainties in technological development, and other factors can affect the work of “dual carbon in China, but these materials are not discussed in the research. These limitations are the indicators of the imperfection of the present study and the further research must develop the exploration and enhancement of these aspects.

The empirical analysis of the difficulties and challenges in the implementation of The Opinions can be further improved by future research. Indicatively, draw up differentiation policy strategies in different regions with various resource endowments, and expose the particular impediments in energy structure transformation between eastern coastal and western inland regions by case studies; survey the enterprise-level technologically upgrading bottlenecks, and measure important indicators, including capital gaps and the rate of talent loss. Meanwhile, more research needs to be supported to enhance the applicability of the "degrowth eco-socialism" theory to the national situation in China. Building a theoretical framework through the introduction of dimensions that include social equity and regional coordination, determine its limits of application in the context of the urban-rural dual structure and industrial gradient transfer. Concerning the uncertainty assessment, a dynamic prediction system with variables of adjustment of international carbon tariffs and delays in major technological breakthroughs needs to be developed, and there should be scenario analysis to simulate the costs and benefits of the emission reduction in various paths. Finally, develop a Chinese low-carbon transformation theory, which is a middle way between environmentally restraint and developmental rights, a Chinese solution to global climatic governance.

6. Conclusion

Currently, China has achieved extraordinary improvement in its development of the dual carbon objectives. With national-level strategic deployment and design at the top level, China has established a clear roadmap of emissions reduction and policy framework. The governments of all levels, enterprises, social organizations, and the population are diligently performing their respective duties and tasks under the guidance of The Opinions of the Central Committee of the Communist Party of China and the State Council on Fully, Accurately and Comprehensively Implementing the New Development Concept and Doing a Good Job in Carbon Peaking and Carbon Neutrality Work, constituting a collective power of green and low-carbon changes and extensive social participation. In the meantime, the theory of “degrowth eco-socialism competently offers significant theoretical backing on the accomplishment of the dual carbon objectives. With an accent on the limitation of ecological resources, the theory presupposes that deep-rooted changes in social organization and the radical transformation of the production and quality of life are required to ensure absolute decoupling between economic growth and carbon emissions and the transition to a sustainable and high-quality development model.

The theory proposes in relation to energy structure a massive shift in dependence on the conventional fossil energy of coal and oil, rapid modernization of the energy system towards cleanliness, low-carbonization, and renewability, and an aggressive non-fossil energy development, including solar, wind and hydropower. At the consumption behavior level, it advances a simplistic, moderate, and eco-friendly green living, directing the masses to develop energy-efficient and emission-less consumption habits and minimizing resource wastage and carbon footprints. The theory proposes that the governments must establish a proper mechanism of incentives and restrictions in carbon market trading, green financial support, tax preferences and emission standard control in order to encourage technological upgrading and management innovation of the enterprises and make individuals to be more actively involved in the practices of the emission reduction in terms of systems and policies.

In general, China has made a row of breakthroughs in streamlining the energy system, increasing energy efficiency, researching and developing low-carbon technologies, and innovating the policy system. Not only does this set a strong foundation in the attainment of the "dual carbon" objectives, but it also shows an active presence and increasingly dominant role of China in the world climate regulations.

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