

Research on clean energy utilization and company's green development strategy under the "dual carbon" goal – Take Sinopec as an example

Guangzheng Wu*

Corporate finance faculty, Queen Mary University of London, London E1 4NS, The United Kingdom

Abstract. At present, China predominantly relies on a traditional energy consumption structure for meeting its energy demands. However, in response to the increasing global awareness of environmental protection, the nation has significantly accelerated its efforts to develop clean energy sources as well as promote green development in various industries. In addition, numerous traditional energy enterprises have gradually initiated efforts to transition towards clean energy solutions. This transition to clean energy is not only pivotal in curbing pollution caused by energy usage but also instrumental in achieving China's dual carbon targets. To gain insights into the adoption of clean energy and green development by domestic enterprises, this paper takes China Petrochemical Corporation as a case study. With comprehensive research focusing on policy, market, natural resources, and social responsibility, we will not only investigate China's homegrown policies but also juxtapose them with international counterparts. This comparative analysis aims to offer an in-depth understanding concerning the environmental challenges and potential bottlenecks faced by Chinese enterprises as they embrace clean energy and green development approaches. Furthermore, based on thorough exploration, the paper will deliver practical suggestions and recommendations for their sustainable growth and development.

1 Introduction

Global climate change has become one of the greatest challenges facing the world today. Due to the increase in human activities, a large number of greenhouse gas emissions have led to the rise in the Earth's temperature, thereby causing extreme weather events, sea level rise, ecosystem degradation, and other disastrous consequences [1]. In order to address this challenge, countries and companies all over the world have put forward their own plans and goals to reduce emissions. The 19th National Congress of the Communist Party of China put forward the goal of promoting an energy revolution and constructing a clean, low-carbon, safe,

and efficient energy system. During the general debate of the 75th General Assembly in 2020, China pledged to achieve carbon neutrality by expecting its carbon emissions to peak prior to 2030, with stringent demands placed on the energy system to meet the objective until 2060. This requires not only the optimization of energy production but also the increase in the proportion of renewable, clean energy to reduce carbon emissions. As a result, China has implemented numerous policies and regulations to promote the development of clean energy, resulting in nearly 130 policies and regulations focused on this objective, from 1997 to 2016.

* Corresponding author: te21873@qmul.ac.uk

The "double carbon" goal refers to the goal of completely eliminating or balancing the global carbon dioxide emissions with absorption by the mid-century. This is an important action to address climate change. According to the United Nations Framework Convention on Climate Change, a reduction in global emissions of at least 50% is needed to control temperature increases within 2 degrees Celsius. The dual carbon goal is one of the key measures to achieve this target. Moreover, achieving this goal can not only mitigate the impact of climate change, but also promote the development of global clean energy and sustainable development. Therefore, the dual carbon goal is of great significance in the current global situation. Governments and businesses should shoulder more responsibilities to achieve this goal.

As one of the key ways to achieve the "dual-carbon" goal, clean energy is becoming the dominant source of energy globally. This is mainly due to the fact that its use process does not produce any emissions, does not cause negative effects on the environment like traditional energy, and it's renewable. In many countries, governments are actively promoting clean energy policies to reduce their reliance on traditional energy sources and achieve emissions reduction targets. Moreover, the use of clean energy has brought many benefits to the economy and society. For example, it can create job opportunities, reduce environmental pollution, and decrease reliance on foreign oil. In China, clean energy has developed rapidly, and the government continues to increase investment and policy support to promote its use. However, the total amount and proportion of clean energy use in our country still lags behind traditional energy sources, and the ratio of clean energy to traditional energy is not yet balanced. There are still some technological and managerial shortcomings. Therefore, integrating clean energy into enterprise's green strategy is an important aspect of corporate operations, and more and more companies are paying attention to and implementing this method [2].

Based on these backgrounds, this paper will focus on the use of clean energy and green strategy, select Chinese Sinopec enterprises for research, compare the similarities and differences between domestic and foreign enterprises in clean energy and green

development from multiple perspectives, analyze the environmental challenges and potential bottlenecks, and give some suggestions.

2 Literature review

Clean energy and sustainable development are widely recognized as important strategies for mitigating climate change and achieving national and international sustainable development goals. Researchers around the world have been working to explore various green technology options and strategies to promote the development of clean energy and sustainable infrastructure.

Many studies have shown that clean energy, including solar, wind, and hydroelectric power, is not only environmentally friendly, but also economically feasible. Countries such as Germany, Denmark, and Spain have already taken the lead in developing renewable energy, with well-established policy and regulatory frameworks. The European Union has also set ambitious targets, aiming to achieve 20% renewable energy by 2020 and 32% renewable energy by 2030. Nicole Miller, an official at the US Energy Information Administration (EIA), said at a 2020 seminar that the cost of renewable energy is continuing to decline, which will help promote the development of clean energy worldwide.

Under China's unique economic and resource conditions, China has set ambitious emissions reduction and green development goals. China has become the world's largest producer of solar and wind turbines. Many Chinese companies have developed innovative green technologies and products, such as electric vehicles and smart city solutions. However, there are still some challenges in China's green development. As experts have pointed out, China needs to further improve its policy framework, technology innovation, and financial incentives. Wang Hongzhang, director of the Energy and Environmental Policy Research Institute at Tsinghua University, said in a 2020 interview that China needs to achieve a low-carbon transition and adopt more active policies to promote the development of renewable energy. (2) In addition, some Chinese companies still face environmental and social responsibility-related issues in their operations.

To address these challenges, some Chinese companies have taken active measures to implement green strategies and improve their sustainability performance. For example, China National Building Material Group Corporation (CNBM) has developed a comprehensive green development plan, including energy conservation, technology innovation, and circular economy goals. The company has also launched a green product line for the building materials industry. Another example is Baidu, China's leading search engine, which has committed to achieving carbon neutrality by 2030 and launched a series of environmental products and services.

In summary, research shows that green development is a long-term and complex process that requires the joint efforts of governments, businesses, and society. By learning from successful cases and adopting innovative strategies, Chinese companies can contribute to achieving sustainable development goals and have a positive impact on the world.

3 Research

3.1 Company introduction

Sinopec, also known as China Petroleum and Chemical Corporation, is one of China's largest manufacturers and suppliers of petroleum and petrochemical products and a large-scale petroleum and chemical group with strong international competitiveness. In recent years, Sinopec has actively grasped the changing trends in the domestic and international energy markets, vigorously strengthened the layout of clean energy projects to achieve the company's goals of green, low-carbon, and sustainable development [3].

Sinopec's investment in clean energy projects mainly includes natural gas, wind energy, solar energy, hydroelectric power, etc. For example, Sinopec and China Huaneng Group jointly invested in the construction of a biodiesel project with an annual production capacity of 56,000 tons. In addition, Sinopec is cooperating with enterprises to build a 10-megawatt photovoltaic power generation project in Algeria. At the same time, in terms of energy utilization efficiency, Sinopec is supporting carbon emission

reduction by researching and applying clean energy technology.

To promote green development, Sinopec has always emphasized the key role of innovation in clean energy technology. In 2021, Sinopec signed a cooperation agreement with US-based Westlake Chemical Corporation to jointly promote scientific research on petrochemicals, new materials, and renewable resources and establish a joint research institute. In addition, Sinopec has made significant breakthroughs in the field of carbon capture and storage, releasing a new process of carbon capture and utilization by acidic gas extraction at home and abroad. This breakthrough is expected to provide more competitive solutions for global climate governance.

3.2 Case analysis

3.2.1 Policy

When comparing the political dimensions of clean energy and green development at home and abroad, it can be seen that governments are generally concerned about developments in this area. Governments around the world have formulated policies and regulations to support the development of clean energy and green industries, such as China's Energy Development Strategy Action Plan (2014-2020) and the U.S. Energy Strategy of the United States [4]. On the other hand, reducing greenhouse gas emissions is also regarded by governments as the main goal of addressing climate change (such as the Paris Agreement). However, there are large differences in policy orientation and implementation, such as the Chinese government's strong promotion of clean energy and green development policies, while the US government's support for renewable energy policies decreased during the Trump administration. In addition, government subsidies and financial support for enterprises are also different, such as the Chinese government has given high subsidies for clean energy projects such as wind and solar energy, while countries such as Europe have paid more attention to adjusting tax policies to encourage the development of renewable energy projects.

Policy support, subsidies and financial support, regulatory pressures, international cooperation, and

development goals have influenced Sinopec's clean energy development and green development strategy [5]. The Chinese government has formulated a series of support policies in the field of energy and environmental protection, such as the Renewable Energy Law and the 13th Five-Year Plan for Energy Development, which provide a favorable policy environment for Sinopec to conduct research and investment in the field of clean energy. At the same time, in the process of promoting clean energy development, the Chinese government has given certain subsidies to solar, wind and other clean energy projects, providing financial support for Sinopec's transformation in the clean energy sector. However, with the improvement of environmental protection laws and regulations, Sinopec is facing greater regulatory pressure and needs to continuously invest in environmental governance and pollution prevention and control facilities. In terms of international cooperation, the Chinese government has carried out extensive cooperation with other countries or international organizations in the field of clean energy, which has provided favorable conditions for Sinopec in clean energy technology innovation and market development. Finally, in terms of development goals, the government actively puts forward low-carbon development, energy conservation and emission reduction goals, requiring enterprises to achieve high-quality green development. This makes Sinopec pay more attention to clean energy and green transformation in the process of strategic development.

3.2.2 Natural resources

The similarities and differences between clean energy and green development at home and abroad at the level of natural resources depend to a considerable extent on the resource endowments and policy guidance of various countries in terms of the development and utilization of natural resources. Globally, clean energy has a quantitative advantage over traditional energy sources. In domestic and foreign markets, many countries have formulated a series of policies and targets for clean energy and green development. As the world's largest carbon emitter, China has great potential and vision for the development of clean energy. Domestically, China is the world's leading producer and consumer of coal,

according to statistics from the China National Administration [6]. As of 2019, coal accounted for 57.7% of domestic energy consumption. While China's abundant coal resources largely support and guarantee energy security, coal, as the main traditional energy source, has a negative impact on the environment and air quality, prompting the Chinese government to seek to develop clean energy to reduce environmental pressures. China has a great advantage in clean energy. According to statistics from the National Energy Administration, in 2019, China's total installed new energy capacity reached 614 million kilowatts, accounting for nearly 30% of the world, of which the cumulative power generation of hydro power, wind power, solar energy and biomass energy was 1.96 million kilowatt-hours. In addition, China has also made important breakthroughs in the research and application of technologies in the field of clean energy such as hydrogen energy and geothermal energy.

Similarly, some foreign countries such as Germany and Denmark also have abundant clean energy resources, and the energy structure is gradually transforming to green. In contrast, the energy mix of developing countries needs to promote green development through the development of clean energy, but thanks to international cooperation, these countries can learn from the technology and experience of developed countries to accelerate the transformation of the energy structure.

In view of the domestic clean energy development and green development strategy, take Sinopec as an example. With the advancement of national green development policies and global consideration of traditional energy use, Sinopec Group, one of China's largest petrochemical companies, is striving to gradually expand its investment in renewable energy to achieve green transformation and low-carbon development. Sinopec has begun to expand its business in the fields of solar energy, wind energy, hydro energy and biomass energy, and has made some progress. This is largely due to the country's abundant natural resources and government support for clean energy. Combined with its own resources and market strategy, Sinopec has great space to exert its advantages in clean energy development and help green development.

3.2.3 Market

At the market level, there are certain similarities and differences between clean energy and green development at home and abroad. The common denominator is the increasing demand for clean energy and green development worldwide, driving governments and businesses to invest and develop the sector. In addition, governments promote clean energy and green development projects through a range of taxes, subsidies and market mechanisms. However, the strength of policy support, market size and consumer preferences in different countries affect the market environment for clean energy and green development to some extent.

In China, for example, the government is actively promoting clean energy access to the market by formulating green development policies. In fact, China has become the world's largest investor in renewable energy and installed capacity, and its market size and potential provide huge space for clean energy development and green development strategies of private enterprises such as Sinopec. In addition, consumers in China are increasingly concerned about environmental issues, and the demand for green products is gradually rising [7]. This brings more market opportunities for Sinopec to achieve green transformation.

It is with this market background that Sinopec continues to expand its clean energy business and implement green transformation strategies, such as investing in solar, wind and hydro energy. Market factors have provided Sinopec with sustained momentum and strong business incentives for clean energy and green development, while competitive pressures and shifting consumer preferences have forced Sinopec to take more proactive measures in low-carbon development.

In short, there are similarities and differences in clean energy and green development at home and abroad at the market level, and factors such as market demand, government policies and consumer preferences promote enterprises to invest and develop this field. In this context, Sinopec actively responds to market demand, promotes clean energy development and green transformation, and adapts to the environmental protection needs of today's society.

3.2.4 Sense of social responsibility

Clean energy and green development are gaining traction globally, largely due to awareness of corporate social responsibility. Although companies in different countries and regions may differ in their implementation of clean energy and green development strategies, their core values and principles are similar. For Chinese companies such as Sinopec, social responsibility is also an important factor in driving their clean energy and green development strategies. First of all, the sense of social responsibility prompts enterprises to pay more attention to environmental protection. Therefore, Sinopec pays more attention to its layout in the field of clean energy to reduce carbon emissions and pollutant emissions, and contribute to global climate change mitigation [8]. In addition, the company is committed to improving energy efficiency and promoting green refining technologies to reduce the consumption of non-renewable resources. Secondly, Sinopec's sense of social responsibility prompts Sinopec to pay attention to the demands of stakeholders in the process of development. This includes maintaining good communication and cooperation with diverse stakeholders such as governments, other enterprises, employees and communities to achieve clean energy and green development. For example, cooperation between Sinopec and the government can promote Sinopec's greater achievements in green development by optimizing the policy environment and providing appropriate incentive mechanisms. Finally, the sense of social responsibility drives enterprises to increase investment in innovation and development. Sinopec contributes to the sustainable development of the clean energy sector by continuously increasing investment in R&D and promoting the innovation and transformation of renewable energy technology. At the same time, the application of innovation results can help reduce production costs, improve product quality, expand profit margins, and ultimately promote enterprises to deliver positive social value while pursuing economic benefits [9].

4 Suggestions

First, in terms of practical recommendations: Invest in advanced technologies to improve energy efficiency.

Sinopec should increase investment in clean energy technologies, focus on improving production energy efficiency, and reducing energy consumption and carbon emissions. Introduce energy-saving and environmental protection equipment and new materials, optimize production equipment, and improve resource utilization. Develop a diversified energy mix. By investing in and developing clean energy such as renewable energy and natural gas, diversifying energy supply sources and reducing dependence on traditional fossil fuels, it will help promote the transition to green development. Establish a circular economy industry chain. Sinopec should try to build circular economy-related industries and cooperate with downstream enterprises to achieve industrial integration and resource sharing. Improve the efficiency of resource utilization through the implementation of measures such as waste recycling and recycling, water conservation and emission reduction. Strengthen green technology and product innovation. Research and develop new clean energy technologies and products, and strive to expand the scale of green industries and improve the level of value chain. And pay attention to building a platform for exchange and cooperation with partners, research institutions, etc., and share technological innovation achievements. Second, in terms of policy recommendations: Improve the system of laws, regulations and supervision. Improve laws, regulations and corporate policies related to clean energy and green development, and ensure that enterprises carry out clean energy and green transformation under the premise of complying with laws and regulations. Provide moderate financial support. The government can encourage enterprises such as Sinopec to increase investment in clean energy and green development through subsidies, tax cuts and other measures, and gradually reduce subsidies when clean energy and sustainable development related technologies are more mature. Implement green development indicators and evaluation systems. Guide enterprises to formulate and implement green development plans and goals, establish and improve the green development performance evaluation index system, and evaluate and encourage the green development achievements of enterprises. Promote international cooperation and exchanges. The government should promote international cooperation

and exchanges in the field of clean energy and green development, guide and support Sinopec to participate in global sustainable development initiatives, learn from advanced international experience and technology, and broaden the international market [10].

5 Conclusion

Globally, with the gradual deterioration of the climate and the collapse of the ecological environment, environmental protection has become the main chord of global development, and clean energy with renewable and environmental protection advantages is particularly important and plays an important role in the green development strategy of various countries. The energy structure dominated by traditional energy requires the state to vigorously develop clean energy and green development strategies, and among these enterprises, Sinopec, as a typical enterprise, plays a leading role in clean energy and green development. In the context of strong support of national policies, Sinopec's transformation is relatively smooth, the state provides a large number of policy support, such as tax exemptions and other policies, and the country has a large number of clean energy resources to be developed, providing rich resource support for the development of Sinopec, secondly, market competition pressure and consumer preferences change force the company to take more active measures in low-carbon development, and finally out of the need to improve Sinopec's corporate image and social responsibility. Clean energy and green development strategies are also important factors.

References

1. Q. Liu, *New Ener Scien Tec*, **30(12)**, 41 (2022).
2. Q. G. Zou, Xue Lilun, **836(02)**, 84-86 (2023).
3. J. Chang, H. Li, *International Bus Account*, **420(18)**, 47-49 (2022).
4. National Development and Reform Commission. *The 13th Five-Year Plan for Energy Development* (2016).
5. General Office of the State Council, *Notice of the General Office of the State Council on the issuance*

of the Action Plan for Energy Development Strategy
(2014-2020).

6. X. Li, Global clean energy transition and China's role. *Contemp World*, **(02)**, 16-22 (2023)..
7. M. A. Delmas, N. Lessem, *Bus Soc*, **56(2)**, 318-356 (2017).
8. J. X. Li, X. L. Zhang, S. Y. Zheng, Y. Chen, *Sustain*, **10(11)**, 4058 (2018).
9. M. Chen, A performance study of Sinopec from the perspective of social responsibility, Master's thesis, Hebei Agricultural University, (2022).
10. X. Yu, J. Chen, Y. Dou, S. Gu, *Oil, Gas, New Energ*, **35(01)**, 26-31 (2023).