Economic Growth Is the Best Solution to China's Environmental Problems: An Analysis within the Framework of Environmental Kuznets Curve

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Abstract: This paper uses the Environmental Kuznets Curve (EKC) theory to analyze the relationship between the Chinese case and environmental quality, and explores whether the Chinese case provides the best solution to environmental problems. In the early stages of China's economic development, heavy industry and pollution-intensive agriculture led to environmental deterioration. However, with the increase in per capita income, the economic structure has shifted from heavy industry to knowledge-intensive manufacturing and services, and the widespread application of clean energy technologies, China's environmental quality has improved significantly. Economic growth provides financial support for clean technology research and development, and also stimulates market investment in green technology. As people's environmental awareness increases, the government has strengthened environmental supervision, which has helped to repair environmental pollution caused by economic development. However, the EKC theory also has limitations. Economic growth may not be equally converted into environmental improvements in all regions, and there are significant differences between regions. In addition, rapid economic development has also led to the loss of biodiversity, and these problems require long-term systematic governance. Therefore, although I recognize the best solution for China to solve environmental problems, it still requires a comprehensive approach of balanced development, effective environmental policies, technology, public awareness, and cooperation to achieve sustainable development in China.

Keywords: Environmental Kuznets Curve (EKC), China's sustainable development, environmental economics, China's environmental policies

1. Theory Application

In the early stages of China's development, its economy relied on heavily heavy industry and pollution-intensive agriculture [1] (Aihui, 2024). Susmita [8] (2002) points out that the cost of pollution will increase with economic growth along the Environmental Nietzsche Curve until per capita income approaches US$5,000. According to statistics from the World Bank, China's per capita GDP reached US$4,428 in 2010. It was during this period that China's pollution, exemplified by severe smog, reached its peak. In 2013, severe and persistent haze weather occurred in many areas of China, and the air quality reached the worst level in history. The PM2.5 concentration in Beijing, Tianjin, Hebei, Yangtze River Delta and other regions is as high as over 300 micrograms/cubic meter. Zhaopeng [10] (2024) points out that the pollution cost of mortality and morbidity caused by urban air pollution in China accounted for 2-3% of GDP per year from 2010 to 2015. However, as China's economy continues to develop, changes in the industrial structure have begun to change environmental pollution. As China's per capita income increases, the economy shifts toward knowledge-intensive manufacturing and services. By using cleaner manufacturing technologies to help reduce pollution, China's large-scale application of new energy manufacturing capacity and technology has helped China effectively reduce pollution. According to statistics released by China's State Environmental Protection Administration (2023), the average concentration of PM2.5 in key economic development areas such as Beijing-Tianjin-Hebei and the Yangtze River Delta dropped by more than 50% from 2013 to 2022, and AQI dropped significantly by 30%. Taking China's air quality improvement as an example, the EKV theory's argument that when economic growth exceeds a certain threshold, the degree of environmental degradation will first increase and then decrease has been confirmed.

2. EKC Explanation

First of all if we look at China's history of economic development, economic growth can fund research and development of clean technologies such as renewable energy, pollution control systems and sustainable infrastructure. China was one of

the major contributors to global pollution before 2010, but after 2013 it was also a major producer of electricity generated from renewable energy sources (ELREC). (IBRD, 2023) However, as per capita income increases, the economy begins to transform towards energy-intensive industries. These industries can help reduce pollution by utilizing cleaner manufacturing technologies. At the same time, it can also provide green loans and financing for energy-saving projects to increase green environmental storage capacity. Additionally, energy-intensive industries can fund R&D projects to develop environmentally friendly technologies. Haider [4] (2023) demonstrates China has achieved better carbon productivity in recent years compared with the past. China's territorial emissions per unit of GDP are declining during 1960-2021. (Figure 1) This shows that China has achieved higher levels of energy efficiency through economic growth in recent years.
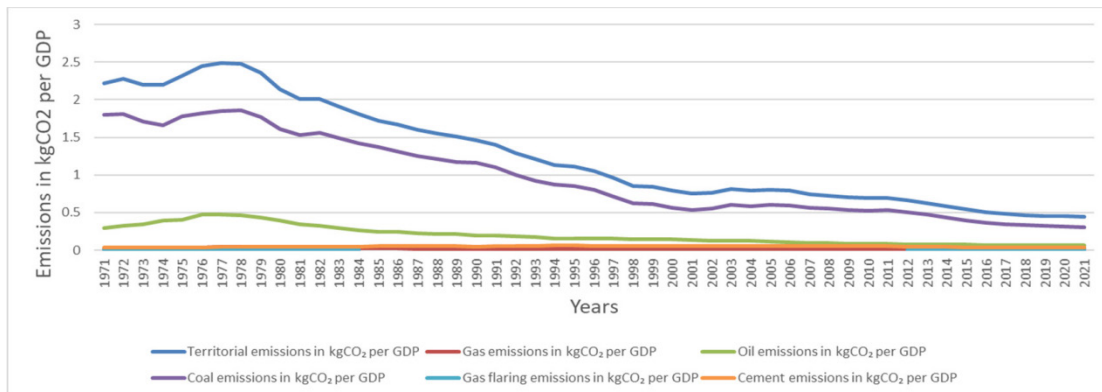

Figure 1. China Average CO2 emissions per unit of GDP from various energy and sectoral sources. (Image source: Global Carbon Atlas)

Second from a market investment perspective, China's economic growth has accelerated the development of green technologies. Taking renewable electricity as an example, driven by the success of the Chinese economy, China is already one of the largest ELREC countries globally. According to the International Energy Agency (IEA) (2020), China generated more than 1,800 TWh of ELRECs, accounting for nearly one-third of the global total. According to the China National Energy Administration (CNEA), if China's annual economic growth continues to remain at around 4.5% by 2030, China will be able to continue to increase the proportion of non-fossil fuels in its primary energy structure to around 20%. According to the ELREC growth trends for hydropower published by the World Bank (2023), hydropower biomass in China will play a key role in achieving a reduction in carbon footprint. (Figure 2) Wang [9] (2023) illustrates after China reached an inflection point in per capita income, the increase in income greatly increased China's willingness to use and develop renewable energy and consume more environmentally friendly products. Strong economic growth is driving China to implement multiple policies and programs to encourage the use of renewable energy technologies and transition to a low-carbon energy system.
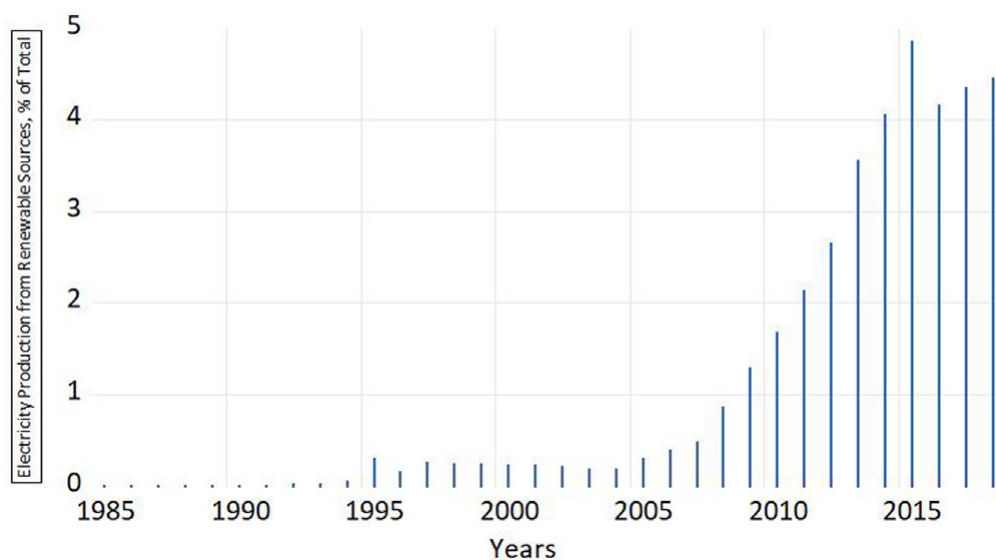

Figure 2. Progress of ELREC, excluding hydroelectric in China. (Data Source: World Bank)

Third, as China's economy develops and matures, environmental quality has become a primary consideration for Chinese residents. This often means growing public demand for cleaner air, water and a healthier environment. As environmental awareness increases, consumers are likely to favor environmentally friendly products and services, thereby forcing companies to adopt sustainable practices. Zheng [11] (2018) points out the association between environmental quality (EQ) and income is U-shaped, but EQ begins to improve after the economy exceeds a growth threshold as individuals and society prioritize ecological awareness and invest in green technologies.

3. Conclusion

This article uses the Environmental Kuznets Curve theory to prove that economic growth is the best solution to China's environmental problems from four aspects: development history, investment wind direction, public awareness and environmental supervision. China's economic development will lead to the upgrading of industrial-intensive industries to resource-intensive industries, thus driving investment in environmental protection. At the same time, the public's increased awareness of environmental protection and the government's upgraded environmental supervision under the changing economic landscape will help repair some of the environmental pollution caused by economic development and increase environmental storage capacity.

At the same time, EKV theory cannot fully explains the regional pollution imbalance caused by China's development differences and the destruction of biodiversity caused by economic development and other ecological problems that require long-term repair. This shows that although economic growth is the best solution to China's environmental problems, economic growth alone is not enough to deal with China's future environmental challenges. Therefore, China needs to adopt a balanced development approach combined with effective environmental policies, technological innovation, public awareness campaigns, and international cooperation in the future to achieve environmentally sustainable development.

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