

Fiscal Policies Promote the Development and Popularization of Green Electricity

-- Taking Anhui Province as an Example

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Abstract: The concept of carbon neutrality is constantly being improved and various carbon neutral project technologies are constantly being developed. Under the current "double carbon" background, green power, as an emerging energy industry, is gradually developing into one of the main clean energy sources in the future. However, as the operation and management system of green power is gradually being improved, its various application fields and its popularization to the public still need to be studied. Through the investigation and research of green power, the analysis of financial policies and the test of the acceptable range of the public, analysis Organize solutions that can promote the use and development of green electricity in current trends in fiscal policies.

Keywords: Carbon Neutrality; Green Electricity; Fiscal Policy; Breakpoint Return.

1. Introduction

Green power is one of the main lines of new energy development in the future, and its application and development will serve as an important "stepping stone" in the field of future economic applications. Anhui Province, a large energy-consuming province with a large population, has great potential for emerging industries. Contact and application have an important say; in terms of population, Anhui Province's consumption of electricity is huge. In terms of price orientation, the people of Anhui Province still have a deep understanding of cost-effectiveness. How can Anhui Province make it happen at present? Promoting the use of green electricity with a cost-effectiveness acceptable to the people of the province can benefit the public in terms of financial expenditures and tax concessions, and at the same time, it will not allow new energy suppliers to "make ends meet". In the era of "double carbon", green electricity has become a New infrastructure must lay a solid foundation so that new energy applications must have stable policy support.

2. Green Power Survey and Analysis

2.1. Background Analysis of Green Electricity

In the summary report of the 20th National Congress of the Communist Party of China, it was stated that promoting green development, promoting the harmonious coexistence of man and nature, respecting nature, complying with nature, and protecting nature are the inherent requirements for comprehensively building a modern socialist country. Nowadays, we must firmly establish and practice the concept that clear waters and lush mountains are valuable assets, plan development from the perspective of harmonious coexistence between man and nature, adhere to the integrated protection and systematic management of mountains, rivers, forests, fields, lakes, grass and sand, and coordinate industrial restructuring and pollution control. , ecological protection, and response to climate change, collaboratively promote carbon reduction, pollution reduction, green expansion, and growth, promote ecological priority, conservation-intensive,

green and low-carbon development, accelerate the green transformation of development methods, implement a comprehensive conservation strategy, and develop green and low-carbon industries. Advocate green consumption and promote the formation of green and low-carbon production methods and lifestyles.

According to data, energy consumption in Anhui Province increased from 42.1782 million tons of standard coal in 1995 to 88.959 million tons of standard coal in 2009, with an average annual growth rate of 5.48%. The energy consumption of the secondary industry sector accounted for 79% of the total energy consumption. More than %; the carbon dioxide produced by energy consumption increased from 35.0736 million tons in 1995 to 85.3612 million tons in 2009. Among the carbon emissions from various energy consumption, raw coal has the largest carbon emissions, accounting for 78% of the total carbon emissions~ 82%; Carbon emission intensity generally shows a downward trend, which is lower than the national average carbon emission intensity, but higher than that of the world and the United States. If we want to successfully lower the carbon emission standard by one level in the new era, the popularity of green power energy in Anhui Province Indispensable, but "wind power" does not mean "high quality and low price".

Although from 2011 to 2020, the average installed cost of onshore wind power in my country dropped from US\$1,459/kW to US\$1,264/kW, a decrease of 13.4%; the LCOE (levelized cost of electricity) dropped from US\$0.066/kWh to US\$0.033/kWh. , dropped by 50%. From 2011 to 2020, the average installed cost of photovoltaic power generation in my country dropped from US\$3,458/kW to US\$651/kW, a decrease of 81%; LCOE (levelized cost of electricity) dropped from US\$0.248/kWh to US\$0.0438/kWh, a decrease of 82% %, but compared with the price of traditional energy power generation, it is still unacceptable. Although wind power generation does not require other additional investment, the price of power generation will only include equipment depreciation expenses, etc., but due to the high hardware investment cost, its production cost is much higher than that of coal and oil. The cost of "thermal power"

for power generation results in the selling price of "wind power" being much higher than that of "thermal power".

In the past, Shanghai's green electricity trading price was an example. The "green electricity" sold in Shanghai was 0.53 yuan/kWh higher than the conventional electricity price. In other words, the usual electricity price is 0.60 yuan/kWh, while "green electricity" is 1.13 yuan/kWh. The cost of using "green electricity" is nearly twice the ordinary electricity price. In addition, there are several important factors that seriously affect Green electricity is widely used in Anhui Province. First, in terms of green power production, my country's new energy resources are seriously unevenly distributed across regions; second, market demand and development capabilities are insufficient, and there is no fair market competition mechanism and promising investment returns; third, Anhui Province has no Sufficient legal support and policy subsidies, but insufficient state support and capital investment; fourth, insufficient knowledge popularization and policy support and many other factors limit the development of green power.

2.2. Current Status of Green Power Development and Research Significance

At the current stage when new energy technology is not mature enough, the government's macro-control and preferential tax reduction and exemption policies are particularly important. Being able to find appropriate fiscal expenditures and tax rate concessions can not only expand the public's acceptance of green electricity in terms of price, but also better Popularize the advantages and general environmental trends of green electricity.

With the development of green power, the country has introduced relevant green power products (green power certificates) with the support of policies to promote the development of green power from the beginning. Green power products are required by national policies to be renewable per mega-hour for power generation companies in the early stage of the market. The electronic certificate with a unique code identification issued by the energy grid is the only certificate of the environmental value of green power. This certificate not only enhances the transaction value of green power, but also provides a display board for the price and results of green power, allowing green power to become part of the real economy and realizing the traceability of green power consumption throughout its life cycle.

Green power can be more in line with the income and expenditure of actual people, enterprises, and even local financial departments, and have a positive guiding effect on green power consumption in Anhui Province. Only then can Anhui Province achieve low-carbon emission standards, implement policies of peaceful coexistence with the environment, and promote Residents' awareness of green consumption and environmental protection has important practical and further development significance for the current implementation of environmental protection policies and topics in our country.

2.3. Financial Mechanism for the Popularization of Green Electricity

Green power trading methods mainly include bilateral negotiation, listing, and centralized bidding; among them, the bilateral negotiation trading method is that market entities independently negotiate information such as transaction volume (electricity), price, green power environmental value

deviation compensation methods, etc., and declare through the green power trading platform, confirmation, and clearing; under the bilateral negotiation transaction method, the buyer and seller can negotiate and determine the overall price of green power transactions on their own, and clearly define the electricity price and green power environmental value.

Listed trading refers to a market entity that declares trading power, price and other listing information through the green power trading platform. On the other hand, the market entity delists, confirms, and clears. In this way, the listing party determines the overall price of green power trading and clarifies it separately. Among them, the price of electricity and the environmental value of green electricity; the delisting party's delisting is equivalent to accepting the overall price of green electricity transactions and the environmental value components of electric energy and green electricity.

In centralized bidding transactions, both market entities, buyers and sellers, declare transaction power, price and other information through the green power trading platform, and legally clear the transaction results according to the quotation. The environmental value of green power is uniformly determined by the average transaction price of the parity green certificate market in the previous settlement cycle in the State Grid Corporation's operating area at the time of the transaction organization. The electricity price is formed by deducting the environmental value of green power from the overall transaction price.

3. Model Construction of Fiscal Policy (Discontinuity Regression Method)

3.1. Technical Route

Model setting and variable selection (regression discontinuity method (RD))

$$GE = PF^a L^b e^{\varepsilon} \quad (1)$$

$$Y = \alpha + \beta(x_i - c) + \delta D_i + \gamma(x_i - c)D_i + \varepsilon_i \quad (2)$$

This model combines two model formulas

GE in (1) represents the effective output of green power, F represents the financial investment in the industry, and L is the time cost variable.

In (2), x_i serves as the core explanatory variable of green electricity price, Y serves as the demand explained variable, and the variable $(x_i - c)$ is standardized for x_i , so that the breakpoint of $(x_i - c)$ is 0, and the interaction term $(x_i - c)D_i$ is to allow the slope of the regression line to be different on both sides of the breakpoint; D_i takes values 1 and 0. If $x > c$, then $D_i = 1$; if $x < c$, then $D_i = 0$; ε_i are all in the model random variable, assuming that the treatment effect of $D_i = 1$ is positive, then the linear relationship between y and x has an upward jumping breakpoint at $x = c$.

3.1.1. Breakpoint Applicability Test

Government regulation under government spending and tax incentives promotes the development and use of green electricity. There should be no artificial manipulation of the price variable. Under normal circumstances, the sample size near the breakpoint cutoff value is basically the same to ensure randomness. Illustrations are provided through SPSSAU. Check the density of sample sizes on the left and right sides. If there are more on one side, it means it is inappropriate.

3.1.2. Analysis of Model Regression Results

After determining the price breakpoint, government expenditure and time change accuracy on green power output,

the model is used normally and begins to analyze the relationship and optimal combination of the explained variables at each point of change as well as the explanatory variables, variables and expected conditions. whether the gap is too large.

3.1.3. Model Robustness Test

Make more use of the differences in the sample database and survey data. For adding control variables, SPSSAU provides data analysis to determine whether the conclusion of the policy model is stable, and graphically determines whether the model can reflect the positive benefits of the variables.

3.2. Problem to be Solved

Adjusting the price of green power transactions can allow the masses and enterprises to meet the expected demand standards and comply with the efficiency comparison of traditional energy sources. In terms of taxation, it can solve the problem of disproportionate profits from enterprises spending too much on new energy. In terms of electricity taxation for the masses, It can be rationalized and accepted, it can find reasonable fiscal expenditures on green power, it can balance the price of green power, and the green power industry develops rapidly and can be widely used.

3.3. Model Empirical Analysis

This model collects data on people's understanding and development status of green power in different regions of Anhui Province, understands the price of green power, and conducts experiments on the price range of green power to find out what the government is doing on the current cost of green power. It is necessary to implement the most appropriate financial subsidies for each unit of green power, which can greatly promote the development of green power in Anhui Province and ensure that the green power supply in Anhui Province reaches a balanced supply.

In the model test, it was found that, with other conditions remaining unchanged, when local governments increased fiscal expenditures on green electricity and related items by 12.34%, the demand for green electricity increased by 78.54%. With other conditions remaining unchanged, When the government lowered the price of green electricity by 0.78% per kilowatt hour, its demand increased by 52.6%. In the model, the breakpoint of the model was obtained when green electricity was 0.96 kilowatt hour/yuan. Among the samples surveyed, 25% They come from prefecture-level cities directly under the jurisdiction of Anhui Province, 60% come from other major prefecture-level cities, and the remaining 15% come from major county-level cities in Anhui Province.

In the power industry, electricity is a necessity in life. However, due to the existence of normal power, normal power is a very strong substitute for green power. Therefore, the demand for green power reflects a huge degree of price, so it lacks elasticity. At the same time, in When the cost remains unchanged but the consumption cost is reduced, the price will relatively decrease. The total sales of green electricity will increase, and the amount of change in the sales volume of green electricity will also be huge. Not only can Increasing the profits of green electricity producers also silently allows more people to choose green electricity.

Under the influence of the "invisible hand" of the market, and due to various obstacles to the development of green electricity, green electricity is more expensive and inconvenient to use than traditional electricity. We can use the

"wind vane" to promote green electricity. ", and under the leadership of those who dare to be the first to eat crabs, more green and environmentally friendly electricity is used. In terms of supply and demand, the demand for green electricity determines the supply of Anhui Province, so the use of financial expenditure and tax incentives is Promote the development and use of green electricity in Anhui Province.

4. Policy Adjustments and Their Impact on Green Power in Anhui Province

4.1. Measures to Promote Fiscal Expenditures for the Use of Green Electricity

Anhui Province is expanding the publicity of green electricity in terms of the concept of green electricity use. According to surveys, "people who don't know what green electricity is" account for a large part of Anhui Province. They want to promote the use and development of green electricity. , it is essential to popularize education about green electricity. Through online education and subtle promotion activities, the government has made the use of green electricity a popular concept among the people of Anhui Province, as one of the development directions of new infrastructure and as a new energy source in the future. One of the mainstream, green electricity should be deeply rooted in the hearts of the people along with the concept of "green environmental protection".

The government needs to take the lead in becoming a benchmark for the development and use of green power. "Green Power Certificate" is a trade advantage for green power production and has a great promotion effect on green power production enterprises. Anhui Province should adopt the "Green Power Certificate" Establish model "green electricity" enterprises, increase the privileges and advantages of "green electricity certificates", increase subsidies for daily office resources for enterprises that take the lead in producing and using "green electricity", and reduce "green electricity" through government subsidies costs of production and use.

For electricity users participating in green power transactions in Anhui Province, the electricity price consists of the green power transaction price, line loss costs in the online link, power distribution prices, system operating costs, government funds and surcharges, etc., and line loss costs in the online link. According to the "stepped" price of electricity (for households or businesses using low-end electricity, 80% of the cost losses caused by the process will be charged; for households or businesses using mid-range electricity, 100% of the losses caused by the process will be charged The fee is charged at 150% to households or businesses that use peak green power.) It plays a fundamental role in emphasizing the resource limitations of green power.

Anhui Province should increase investment in the green power supply system, and increase green power loss prevention measures for "green power" transportation channels. Anhui Province's survey of green power users shows that the proportion of users is very small, only 13 %, and Anhui Province is not an energy base suitable for establishing green power production. While promoting green power, we must also ensure that the normal economy in Anhui Province can grow stably. Anhui Province cannot be abandoned because of the promotion of green power. Inner body electrical system. Therefore, the process from transportation to use of green electricity in Anhui Province is

extremely important. Only by letting more people understand the benefits of green electricity will more people choose green electricity.

4.2. Tax Measures to Promote the Development of Green Power

Tax incentives promote the production and consumption of green electricity by the masses and enterprises from within. Different from the compensation measures given by the government from external incentives, tax incentives reduce the cost of green electricity through special tax rates for green electricity production and tax subsidies at the time of consumption. decline, thereby expanding the production of green electricity and the consumption of green electricity. With the promotion of new infrastructure, various local governments have certain tax incentives for new infrastructure tax policies. Since the green power industry is highly restrictive and the investment of production resources is limited, green power has been implemented in Anhui Province. Some tax incentives will not cause huge fluctuations in the economy and interest rates.

The government adopts different tax methods for products related to green power supply systems and appliances. In order to ensure the stability of tax incentives, it can also sign a "Green Power Related Products Purchase and Sales Policy" and select the products that can best benefit the people through data screening. institutional approach.

In the early days of green power, the main direction across the country was to reduce various related taxes for green power production companies. Therefore, Anhui Province adopted a preferential tax policy to provide power supply project subsidies and no tax (on the fees charged by power supply companies from users). It is used for construction and renovation of power supply projects with voltages of 110 kV and below, including power supply and distribution subsidies, and no value-added tax is levied; rural power grid maintenance fees are tax-free. Rural power grid maintenance fees collected by rural power management stations ; Electricity tax reduction. General taxpayers who sell electricity produced by small hydropower and thermal power generation units below the county level can calculate tax at a collection rate of 6% according to a simple method, and are allowed to issue special value-added tax invoices; Three Gorges power products will be refunded immediately . From the day the Three Gorges Power Station generates electricity, its exported power products will be levied VAT at the applicable rate. For the part where the VAT tax burden on power products exceeds 8%, the VAT policy will be refunded as soon as it is collected; rural power management stations will be charged Rural power grid maintenance fees (including low-voltage line loss and maintenance fees and electrician expenses) that are collected from users when electricity prices are charged are exempted from value-added tax.

The main purpose of tax reduction and exemption is to stimulate the consumption of green electricity by the people of Anhui Province, and to pin down tax incentives to specific matters and refinement, once again ensuring that taxation only plays a role in the green power field in the early stages of operation. A protective effect will not allow green power to develop into a core force that monopolizes the power market.

5. Conclusion

Green power is an important part of emerging energy in new infrastructure. However, in Anhui Province, the difference between the proportion of green power use and normal power use and the population is too large. If Anhui Province cannot have a stable If there are policies and programs to promote the development of green electricity in Anhui Province, it will be difficult for many new energy things to be effectively accepted by the public in the future, and it will not be able to achieve true green environmental protection.

Fiscal expenditures and tax incentives are two basic means of regulating the development and use of green power in Anhui Province. Finding suitable policy measures will not only allow the people of Anhui Province to accept the development of green power more quickly, but also have a clear understanding of the technology of green power. Some high-cost operations brought about by improvement will be compensated to a certain extent, so that green power will not be so price-prohibitive in the face of normal electric energy. On the premise that the people of Anhui Province have a deep understanding of cost-effectiveness, they can pass policies Allowing more people to accept and use green electricity is a great success in the current development of green electricity.

Although there are currently many difficulties that are difficult to overcome in green power, and there are many limitations in technology, there is an insurmountable gap in the full-scale promotion of true green power, causing the government, society, and the public to have different understandings of green power. , these different views and opinions cannot be eliminated through fiscal expenditure and tax incentives before solving the current dilemma of green electricity. However, to a certain extent, the role of the government in the market can be used to replace the role of technological progress in promoting green power. electricity, and will be a positive help in overcoming the difficulties of green electricity.

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