ISSN:2790-1688 DOI: 10.56028/aetr.3.1.220

Research on the path of the digital economy in Shandong Province to help achieve the "carbon peaking and carbon neutrality" goals- based on panel regression analysis

Jianing Liu, Yi Zhang*

Shandong University of Science and Technology

*jingdaihuakai6016@163.com

Abstract: Since the "carbon peaking and carbon neutrality" goal was proposed, green and low-carbon development has become a unified action of all provinces in the country. carbon peaking and carbon neutrality, as the driving force of the provinces to promote high-quality economic development, has become the focus of many scholars. In addition, today's society is in the era of digital economy, the rapid development of digitalization and the rapid popularization of digital technology has become an important means to help achieve the carbon peaking and carbon neutrality target. As one of the largest carbon emitting provinces in China, Shandong Province has become a top priority to use digital economy to help achieve the "carbon peaking and carbon neutrality" goal. Therefore, based on the panel data of 10 cities in Shandong Province from 2011 to 2019, this paper uses the max-min standardization method, panel regression model and other measurement methods to explore the path of digital economy to help achieve the "carbon peaking and carbon neutrality" target.

Keywords: Carbon peaking carbon neutrality, digital economy, panel regression model, green development

1. The introduction

The research object of this paper is ten cities in Shandong Province. Respectively in eastern, central and western regions, the time span is 2011-2019, by the maximum minimum value standardization method to measure the relevant cities and digital economic indicators, and as a core variable, with selected ten cities in shandong is carbon emission levels as explained variable, with economic development level and energy consumption, external dependency as control variable, and then through a system The panel regression model was constructed according to the robustness test, and the impact of digital economy level on provincial carbon emission level was analyzed according to the regression analysis results, so as to help Shandong Province achieve carbon peak and carbon neutrality as soon as possible. In view of this, this paper puts forward using the econometric model of panel regression model, the 10 cities in shandong province in 2011-2019 digital economy development to study the effects of carbon emissions, and economic development level, measured by the comprehensive energy consumption, as other explanation variable external dependency, affect the digital economy development from carbon conductive mechanism [7], It plays a positive role in clarifying the focus of future work.

2. Index measure and variable selection

2.1 Selection and measurement of core explanatory variables

In this paper, digital economy is selected as the core explanatory variable. Since digital economy is an emerging economy extending to various industries on the platform of the Internet, the whole economic business forms constitute a huge and complex system. It is not comprehensive and scientific to measure the development level of digital economy with a single index [8]. It cannot reflect its integrity, which needs a set of scientific and reasonable digital economy measurement index system to reflect. Based on the current research status, this paper adopts the digital financial inclusion index to complete the measurement of the digital economy development level index. This

ISSN:2790-1688 DOI: 10.56028/aetr.3.1.220
paper extracted the digital financial inclusion index of eastern Shandong Province (Qingdao, Yantai, Weihai, Dongying), central Shandong Province (Jinan, Zibo, Linyi, Jining) and western Shandong Province (Dezhou, Binzhou) from 2011 to 2019. As specific data of some cities cannot be obtained and it is not representative, Therefore, Qingdao City, Yantai City, Weihai City, Dongying City, Jinan City, Zibo City, Linyi city, Jining City, Dezhou City and Binzhou City are selected as regional city representatives of Shandong Province. The maximum and minimum standardization method is adopted to construct digital economic indicators. The specific measurement process is as follows.

Firstly, the digital financial inclusion index is standardized. Through the screening function in EXCEL, the maximum value MAX, minimum value MIN and the difference value DV of each index of 10 cities were obtained. The maximum value and minimum value of digital financial inclusion index of 10 cities in Shandong Province were 0.98 and 0.06, respectively, and the difference value was 0.92.

Second, the range method (maximum, minimum) is used to standardize the dimensionality. In the standardization of various indicators, the data of a certain indicator may be 0 after standardization. Therefore, the value of each indicator is calculated, and the value is meaningless when the value is 0. Therefore, the extreme influence is removed. Add 0.0001 to each dimensionalized value of the above data in order to facilitate the calculation of the value of each index. Further, the formula $\frac{X_i - \mathrm{MIN}_i}{MAX_i - \mathrm{MIN}_i}$ (xi refers to the value obtained in the previous step) is used to obtain the final value of each index, as shown in the table below.

Table 1 Descriptive statistics of digital economic indicators in Shandong Province

Individual variables	The maximum	The minimum value	The standard deviation
Qingdao	0.84	0.06	0.78
Yantai	0.87	0.12	0.75
Weihai	0.88	0.09	0.78
Dongying	0.89	0.10	0.79
Jinan	0.85	0.06	0.80
Zibo	0.90	0.12	0.77
Linyi	0.94	0.16	0.77
Jining	0.95	0.17	0.78
Dezhou	0.98	0.23	0.75
Bingzhou	0.93	0.18	0.74

The third step is to find out the mean value of digital economy development of each city, and conduct ascending order to get the development situation of digital economy of each city, and complete the measurement of core explanatory variables. As can be seen from the following table, Qingdao, Yantai, Jinan, Linyi and Zibo are the cities with fast digital economy development.

Table 2 Index Ranking of digital economy development level in Shandong Province

Shandong Province (District/City)	Digital economy development level indicator	ranking
Qingdao	0.63	1
Yantai	0.60	2
Jinan	0.53	3
Linyi	0.51	4
Zibo	0.48	5
Jiniing	0.48	6
Dezhou	0.45	7
Weihai	0.44	8
Dongying	0.43	9
Bingzhou	0.42	10

ISSN:2790-1688 DOI: 10.56028/aetr.3.1.220

The fourth step is to logarithmically eliminate the magnitude of the above processed data, as shown in the following table.

Table 3 Results of logarithmic processing of digital economic indicators in Shandong Province

Cities	2011	2012	2013	2014	2015	2016	2017	2018	2019
Qingdao	-0.17235	-0.38662	-0.66591	-0.78100	-1.06267	-1.30356	-1.76162	-2.13639	-2.77129
Yantai	-0.13638	-0.33179	-0.53904	-0.67744	-0.92449	-1.14686	-1.53476	-1.76493	-2.12981
Weihai city	-0.13273	-0.32857	-0.57543	-0.68391	-0.92401	-1.12349	-1.59179	-1.84333	-2.39055
Dongying city	-0.11814	-0.35344	-0.59787	-0.79985	-0.95536	-1.24960	-1.62760	-1.84830	-2.29120
Jinan	-0.15866	-0.36076	-0.65896	-0.74847	-1.06289	-1.32523	-1.79032	-2.20554	-2.86283
Zibo city	-0.11067	-0.35415	-0.57174	-0.67729	-0.93838	-1.09988	-1.45265	-1.73311	-2.07947
Dezhou	-0.02096	-0.18896	-0.40349	-0.46247	-0.64432	-0.86588	-1.13105	-1.27312	-1.47312
Linyi city	-0.06413	-0.23749	-0.45249	-0.51580	-0.76697	-0.98901	-1.30997	-1.53682	-1.80658
Binzhou city	-0.07420	-0.26222	-0.46744	-0.53739	-0.74856	-0.98074	-1.27211	-1.44646	-1.69396
Jining city	-0.04808	-0.23379	-0.44687	-0.52046	-0.73545	-0.95114	-1.26377	-1.46858	-1.77035

2.2 Selection and measurement of other control variables

Economic development level, energy and resource reserves, environmental pollution, government policies, and city size become the factors that affect carbon emissions. In order to make the research results more accurate, this paper introduces other relevant variables for control. The control variables include the level of economic development, energy consumption and external dependence. First of all, the GDP representing the level of economic development is selected. The GDP in this paper is the value after excluding the real estate and financial industry, and the economic level will have an important impact on the terminal energy consumption and carbon emissions of residents. Secondly, the annual electricity consumption, which represents energy consumption, is selected. Coal occupies the primary position in the energy consumption structure of our province, and coal is mainly consumed by power generation. Therefore, energy consumption will also have an impact on the result of carbon emission. Then, the degree of external dependence (total import and export volume /GDP), which represents the degree of opening to the outside world, is selected. The new carbon emission reduction technology and management mode brought by opening to the outside world will have a certain impact on energy conversion efficiency and carbon emissions. Therefore, the above indicators are selected as explanatory variables. The other explanatory variables listed above are all the same as the core explanatory variables in order to solve the heteroscedasticity problem and carry out logarithmic processing.

2.3 Selection and measurement of explained variables

In this paper, carbon emissions were taken as the explained variable, and the carbon emissions of ten cities in Shandong Province from 2011 to 2019 were obtained from the Shandong Statistical Yearbook, ceads China Carbon Accounting Database and the statistical bulletins of various cities to ensure the reliability of the data.

ISSN:2790-1688 DOI: 10.56028/aetr.3.1.220

Table 4 Variables and their symbols

	The variable name	Variable representation symbol
Explained variable	Carbon dioxide emissions	Carbo
Other Explanatory variables	Level of economic development	Econo
	Energy consumption	Energ
	External dependency	Forei
Core explanatory variable	Digital economy development level	Digit

3. Research hypothesis

3.1 Hypothesis 1 Digital economy will have a positive effect on carbon emissions

With the development of digital economy in our province, digital economy will have a positive effect on carbon emissions and reduce carbon emissions. On the first hand, for example, the large-scale application of digital economy accelerates the combination of information technology and industrial technology, and the industrial Internet can achieve quality improvement, efficiency improvement and emission reduction (Han Jing et al., 2022), change the traditional industrial mode, and effectively reduce carbon dioxide emissions. Secondly, the continuous maturity of big data green technology can optimize ecological management, support carbon absorption, and promote energy conservation and emission reduction. With the support of the digital economy, digital infrastructure has achieved unprecedented development (Yu Shan et al., 2022). It explores the effective path of building green cloud services, innovates and develops sustainable products and technologies such as renewable energy, data center heat dissipation, and server availability improvement. For example, "100 Trillion Solar Energy Project", a renewable energy project invested by Amazon in Shandong Province, can reduce the electricity and energy consumption of industries such as the Internet of Things, thereby reducing carbon emissions. The continuous improvement of the digital industrial chain, accelerating the integration of high energy consumption industries, digital economy and circular economy, improving energy efficiency while optimizing the energy structure, and promoting the comprehensive implementation of carbon reduction actions, this hypothesis is made in view of this.

3.2 Hypothesis 2 Economic development level will have a positive effect on carbon emissions.

The higher level of economic development means the higher income of residents and the higher demand for energy. As the main fuel of energy consumption, coal will increase carbon emissions to a certain extent with the increase of energy consumption.

3.3 Hypothesis 3 Energy consumption will have a positive effect on carbon emissions.

Coal occupies a major position in the traditional energy structure, such as thermal power generation, which is mainly burned by coal, so it will lead to the increase of carbon emissions.

3.4 It is assumed that the four-external dependency (total import and export volume /GDP) will have a negative effect on carbon emissions.

Through opening to the outside world, advanced technology and experience will be introduced, which will be widely used in mining and other industries with high energy consumption. By improving energy conversion efficiency, carbon dioxide emissions will be directly reduced to achieve the goal of reducing carbon emissions.

ISSN:2790-1688 DOI: 10.56028/aetr.3.1.220

4. Empirical test

4.1 Model hypothesis

The data variables obtained through the above research have two dimensions. The selected model should not only reflect the law of sample data in a certain period, but also reflect the law of changes of each sample data over time. Therefore, panel regression model is the most suitable for this study and analysis. Based on the obtained data, this paper first constructs a panel regression model to empirically analyze the impact of the development of digital economy on carbon emission. Due to the large number of variables in this study, the regression calculation formula is first introduced, which is detailed as follows.

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + ... + \beta_k X_{ki} + ui(i = 1,2,....n)$$

Where, is the carbon emission of the explained variable; As explanatory variables, this paper selects digital economic indicators as the core explanatory variables, the explained variables take carbon emissions as the object, and other explanatory variables take the level of economic development, energy consumption, and external dependence as the research object. Is the constant term in panel regression model; . Is the net effect of 1 unit change in partial regression on Y; n is the total number of cross-sectional samples, and is the random disturbance term. The relevant variables introduced in the model may have errors that affect the final results, so the random disturbance term is introduced. Before determining the panel model, it is necessary to carry out the test, and conduct descriptive statistical analysis on the selected variables. Since there is a quantitative difference between different variables, the variable data should be standardized. According to the following table, the maximum value of economic development level is 0.95, the minimum value is 0.04, and the standard deviation is 0.95. The maximum value of energy consumption was 1.00, the minimum value was 0.01, and the standard deviation was 0.99. The maximum value of external dependency was 2.29, the minimum value was 0.15, and the standard deviation was 2.14. The maximum value of digital economy development is 0.98, the minimum value is 0.06, and the standard deviation is 0.92. Then, F-test, BP test and Hausman test were used to determine whether the panel regression model was a mixed estimation POOL type, a fixed effect FE type or a random effect RE type.

Variable	The variable name	Number of observations	The mean	The maximum	The minimum value	The standard deviation
Level of economic development	Econo	90	0.30	0.95	0.04	0.95
Energy consumption	Energ	90	0.22	1.00	0.01	0.99
External dependency	Forei	90	0.68	2.29	0.15	2.14
Carbon dioxide emissions	Carbo	90	0.29	1.00	0.01	0.99
Digital economy development level	Digit	90	0.45	0.98	0.06	0.92

Table 5 Descriptive statistical analysis of variables

5. Model selection

5.1 Inspection and analysis

For model 1, only Carbo and Digit were added to construct the panel model. It can be seen from the following table that the F-test shows a significance at 5% level. Compared with the POOL model and the FE model, the FE model is suitable. Then BP test was conducted, which showed a significance of 5%. Compared with POOL model, RE model had better effect. Since Hausman did

ISSN:2790-1688 DOI: 10.56028/aetr.3.1.220
not present significant test results, RE model is better than FE model. Therefore, RE model is taken as the final result.

Table 6 Summary of test results (n=90)

Test type	Testing purpose	Test value	Test values for p	Inspection conclusion
F test	Compare and select FE model and POOL model	*F* (9,79)=13.699	0.000	FE model
BP inspection	RE model and POOL model are compared and selected	$\chi^2(1)$=113.149	0.000	RE model
Hausman test	FE model and RE model were compared and selected	$\chi^2(1)$=0.002	0.969	RE model

On the basis of Model 1, the explained variable (Carbo), the core explanatory variable (Digit) and other explanatory variables (Econo) were added in Model 2. At this time, the F-test showed a significance of 5%, and the FE model after comparison was better. The BP test shows the significance at 5% level. The POOL model should be compared with the RE model, and the more appropriate RE model should be selected. Because the significance of Hausman test is not shown, it means that the RE model is better than the FE model. Through the above research and analysis, it is found that the more excellent RE model should be chosen as the final result.

Table 7 Summary of test results (n=90)

Test type	Testing purpose	Test value	Test values for p	Inspection conclusion
F test	Compare and select FE model and POOL model	F (9,78)=12.805	0.000	FE model
BP inspection	RE model and POOL model are compared and selected	$\chi^2(1)$=105.160	0.000	RE model
Hausman test	FE model and RE model were compared and selected	$\chi^2(2)$=0.515	0.773	RE model

For Model 3, when the explained variable (Carbo), the core explanatory variable (Digit), and other explanatory variables (Econo) and other explanatory variables (Energ) were added, the F-test showed a significance at 5% level, so FE model was better. The BP test shows the significance at 5% level. At this time, it is better to choose the RE model. The Hausman test showed the significance at the 5% level, so the FE model was better, and the FE model was finally determined.

Table 8 Summary of test results (n=90)

Test type	Testing purpose	Test value	Test values for p	Inspection conclusion
F test	Compare and select FE model and POOL model	F (9,77)=5.785	0.000	FE model
BP inspection	RE model and POOL model are compared and selected	$\chi^2(1)$=5.242	0.011	RE model
Hausman test	FE model and RE model were compared and selected	$\chi^2(3)$=26.590	0.000	RE model

In the final model IV, the explained variable (Carbo), the core explanatory variable (Digit), other explanatory variables (Econo), other explanatory variables (Energ), and other explanatory variables (Foreig) were added, and the F-test showed a significance at 5% level, so FE model was better. The

ISSN:2790-1688 DOI: 10.56028/aetr.3.1.220
significance of BP test at 5% level means that the RE model is better. Hausman test showed a significance at 5% level, and FE model was considered to be better, so FE model was finally selected.

Table 9 Summary of test results (n=90)

Test type	Testing purpose	Test value	Test values for p	Inspection conclusion
F test	Compare and select FE model and POOL model	F (9,76)=6.370	0.000	FE model
BP inspection	RE model and POOL model are compared and selected	$\chi^2(1)$=4.858	0.014	RE model
Hausman test	FE model and RE model were compared and selected	$\chi^2(4)$=34.617	0.000	RE model

5.2 Analysis of panel regression model results

Table 10 Summary of panel data results

	Model 1	Model 2	Model 3	Model 4
Digit	0.152 (1.301)	0.363* (2.084)	0.505* (2.149)	0.708** (2.811)
Econo		0.608 (1.621)	1.387* (2.018)	2.206** (2.796)
Energ			-0.214 (-1.362)	-0.205 (-1.332)
Forei				1.003* (1.999)
R^2	0.010	0.057	-0.446	-1.815
Number	90	90	90	90

Note: * denotes the significance of p<0.1 at the 10% level and ** denotes the significance of p<0.05 at the 5% level.

Firstly, Model I test was carried out, and the explained variable (Carbo) and the core explanatory variable (Digit) were added. For Digit, it did not show any significant influence on Carbo.

On the basis of model 1, the explained variable (Carbo) and the core explanatory variable (Digit) are retained, and other explanatory variables (Econo) are added. For Digit, it shows a significance of 5%, indicating that Digit can have a significant positive influence on Carbo, while Econo has no significant influence.

Then, according to Model 2 and Model 3, the explained variable (Carbo), the core explanatory variable (Digit) and other explanatory variables (Econo) are kept, and other explanatory variables (Energ) are added. For Digit and Econo, both of them show significance at 5% level. And the regression coefficients are 0.505 and 1.387, respectively, which are both greater than 0, indicating that Digit and Econo can have significant positive influence on Carbo. Energ hasn't had a significant impact on Digit at this point.

ISSN:2790-1688 DOI: 10.56028/aetr.3.1.220

Finally, the explained variable (Carbo), the core explanatory variable (Digit), other explanatory variables (Econo), other explanatory variables (Energ), and other explanatory variables (Foreig) were added into Model 4. For Digit and Econo, the significance at 1% level was shown. And the regression coefficients are 0.708 and 2.206, respectively, which are both greater than 0, indicating that Digit and Econo have obvious positive influence on Carbo. Among them, Digit has positive influence on Carbon, which means that the higher the development level of digital economy, the lower the carbon emission. The development of digital economy will promote the transformation and upgrading of industries with high energy consumption, and at the same time bring the progress of carbon capture technology, which can effectively curb carbon emissions and lead to a decrease in carbon emissions. This result has passed the significance test, indicating that its effect is obvious and consistent with the reality. Econo has a positive relationship with Carbon, which shows that with the continuous economic development, the consumption of various energy sources in both production and life will increase, and most of the energy consumption will generate carbon dioxide, which will lead to an increase in carbon emissions. According to the data in the table, for every 1% increase in the level of economic development, Would increase carbon emissions by 2.206 percent, which is still in line with reality. However, for Energ, it does not pass the significance test, indicating that energy consumption does not play an obvious role in the generation of carbon emissions. For Forei, it shows a significance of 5%, and the regression coefficient value is 1.003>0, indicating that Forei has a significant positive impact on Carbo, which means that the larger the city scale, the faster the urbanization process leads to population aggregation, the widespread use of transportation tools and the large-scale output of urban garbage. This result is consistent with the actual situation and has obvious effect.

5.3 Robustness test

In order to further explore the nonlinear impact of digital economy on carbon emissions and ensure the reliability of the research results, this paper uses the substitution variable method to test the robustness of the above regression model [9]. Based on the practice (Miu Jun et al., 2022), carbon emission per capita (Casto) can be used as the explained variable (Carbo) for relevant substitution. For the explanatory variable, Citys is selected as other explanatory variables to replace energy consumption. With the deepening of reform and opening up, the scale of urbanization is becoming larger and larger, which promotes the population to gather in the cities and increases the consumption of energy, thus affecting the carbon emissions.

Table 11 Robustness test result analysis of panel model

Variable	FE model
Econo	1.050** (3.249)
Citys	-0.108 (-1.489)
Forei	0.422 (1.929)
Digit	0.321** (2.756)
R^2	-0.913
Number	90

Note: * denotes the significance of p<0.1 at the 10% level and ** denotes the significance of p<0.05 at the 5% level.

FE model was selected. It can be seen from the above table that for Econo and Digit, both present a significance of 1%, and the regression coefficient value of Econo and Digit is 1.050 and 0.321, both greater than 0, indicating that Econo and Digit can both have a significant positive influence on Casto. It is consistent with the above analysis conclusion and the actual results. For Citys, it is not significant. For Forei, it is not significant. The robustness test shows that digital economy and the level of economic development will have an impact on carbon emissions, and the

ISSN:2790-1688 DOI: 10.56028/aetr.3.1.220

results are robust. This paper constructs the path exploration model of digital economy to help realize the "carbon peaking and carbon neutrality" goal, and analyzes the impact of digital economy in Shandong Province on the realization of the "carbon peaking and carbon neutrality" goal. The empirical analysis results show that digital economy is helpful to reduce carbon emissions, and the role of the central and western regions is greater than that of the eastern regions. Digital economy is of great significance to promote the green and low-carbon economic development of Shandong Province. The role of digital economy still exists through robustness tests such as changing explanatory variables. Digital economy has an indirect impact on regional carbon emission through technological innovation and industrial structure optimization.

6. Conclusion

Shandong Provincial government should guide the industries with better development of digital economy to appropriately tilt to the central and western regions, and accelerate the integration of real industries and digital technology in the central and western regions. The central and western regions should accelerate the layout of the digital economy development strategy, speed up the construction of new digital infrastructure, lower the threshold for the use of digital technologies, and give greater impetus to the realization of low-carbon economy. The dynamic and differentiated digital economy development strategy is adopted to gradually improve the status quo of unbalanced development among regions, accelerate the elimination of the digital divide, and drive low-carbon and green development through digital transformation [10].

Acknowledgements

The Youth Project of the National Social Science Fund of China “Research on the optimization and upgrading of regional industrial chain promoted by the development of digital economy in central cities of Yellow River Region” (21CJY008)

References

[1] Ya Ping Wu. Promoting carbon peaking carbon neutralization by six systematic measures [J]. Economic Research Information,2021,(08): 26-28.]

[2] Fei Xue, Minliang Zhou, Jiaqi Liu. Effect of Digital infrastructure on carbon emission reduction: A quasi-natural experiment based on "Broadband China" strategy [J]. Southern Economy, network first: 18.

[3] Huaming Zhang, Huwei Zhang. Study on the impact of economic openness on carbon emission -- based on the empirical data of six provinces in Central China [J]. Coal Economics Research, 222,42(03):28-36.

[4] Xiao Guang. Analysis of the impact of "carbon peaking and carbon neutrality" policy on industrial upgrading under the background of digital economy. China Development,2021,21(S1):67-71.]

[5] Weizhen Yu, Na Liu. How the government plays a good role in digital innovation [J]. Academy of Science,2021,2021(01)139-148.

[6] Junjun Miao, Jing Chen, Tianzheng Fan, Yanqin Lv. Impact of digital economy development on carbon emission: Based on panel data analysis of 278 prefecture-level cities [J]. Southern Finance,2022(02):45 -- 57.

[7] Shan Yu, Xiufeng Fan, Haowen Jiang. Research on the impact of digital economy development on carbon productivity [J]. Statistics and Information Forum, 222,37(07):26-35.

[8] Haiyan Shang, Peifang Zhao, Yunhan Sun. Evolution of digital economy in business niche: An analysis based on provincial panel data [J]. Journal of Shandong University of Finance and Economics,2021(06): 45-55+66

ISSN:2790-1688 DOI: 10.56028/aetr.3.1.220
[9] Gao Han, Yubo Wang. Effects of environmental tax on Manufacturing capacity Utilization in OECD countries: Implications for the high-quality development of China's manufacturing industry [J]. Industrial Economics Research,2020(02) :87-101.

[10] Practical challenges and practical paths of digital economy enabling green development [J]. Reform,2022(09):1-13. (in Chinese)

[11] Jiandong Wang, ShiyangYu , Yue Dou. East and West Calculation: Overall framework and implementation path research of data Cross-domain circulation in China [J]. Electronic Government Affairs,2020(03):13-21.

[12] Fen Wang cotton. Promote industrial green and low-carbon transformation with digital technology. Economic Daily News (Theory Edition), August 11,2021.

[13] Xicheng Lin. To meet the goal of "carbon peaking and carbon neutrality" and race the track of "decarbonization" [J]. Industrial City,2021(12):80-81.