

The Local Government Behavior Analysis in Development of Chinese New Energy Industry

—Taking Hebei Provincial Government as an Example

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How to cite this paper: Dong, H.X. and Zhao, H. (2017) The Local Government Behavior Analysis in Development of Chinese New Energy Industry. *American Journal of Industrial and Business Management*, 7, 633-642.

<https://doi.org/10.4236/ajibm.2017.75047>

Received: April 21, 2017

Accepted: May 21, 2017

Published: May 24, 2017

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Abstract

China's new energy industry has been developed rapidly under the support of the government. It is of great practical significance to study the local government's support for the development of new energy industry in the tax sharing system. The article is through the combination of questionnaire and fuzzy mathematics method to analyze the social public satisfaction with local government's new energy policy, to provide a better reflection of local government policies to promote the development of new energy industry.

Keywords

The Local Government, Behavior Analysis, New Energy Industry

1. Introduction

New energy, also known as unconventional energy, refers to the various forms of energy outside the traditional energy and refers to the development or utilization of active research, or to be promoted, such as solar energy, geothermal energy, wind energy, ocean energy, biomass energy and nuclear fusion energy, etc. As a strategic emerging energy, new energy has unparalleled advantages, not only can it effectively reduce air pollution, but it can also protect the environment, adjust the energy consumption structure, save resources, promote economic transformation, and change industrial growth mode. So, the governments all over the world are making policies to develop low-carbon economy, and promote the development of new energy industry and industrial competitiveness.

China's new energy industry development from the outset cannot be separated from the government's support and supply. The local government is as an extension of the Central Government in various regions. Both the Central Gov-

ernment and the Local Governments, have a significant impact on the development of new energy. But because of their own and different characteristics between the Central Government and the Local Governments, the Local Governments are responsible for the original intention, but also implement the Central Government policy. This dual identity makes the Local Government in the management of the new energy industry to show different behaviors of the Central Government. Since 1994, China has implemented the reform of tax sharing system, and the mode of economic decentralization has been widely discussed at home and abroad. Qian and Roland argue that this reform has had a significant impact on local finance, emphasizing the incentive role of decentralization to local officials, giving local governments greater autonomy and flexibility to develop the local economy. At the same time, Oliver, Whiting and Zhou on the basis of the theory of "Chinese characteristics of federalism" conducted an in-depth discussion, from the government officials of the performance evaluation and promotion of incentives to study the Chinese government internal governance characterization [1]-[7].

The role of the Local Government's two-way agent in the development of new energy industry has been vividly reflected in the process of development. Guo and Jia adopted a three-stage sequential game model; they analyzed that the Local Government in the dual incentive financial interests and political promotion, always have a strong incentive to invest by the violation of preferential policies, which lead to enterprise investment impulse [8]. Qiu according to the index evaluation system of the benefit of economic development as the core that will make the Local Government compete and evolve into a game of chicken in the new energy industry, may lead to irrational use of fiscal subsidy, such as the benefits transmission [9].

The Local Government is the characteristics of the Central Government agents in the region and resolutely implements the central decision-making; combining with local agents for their motivation and local considerations of the new energy industry development on the basis of the central decision-making of new energy gives a new connotation. The provinces with different resource endowments have different emphases on the development of the new energy industry, but the common point is that many local policies have been issued to support the development of new energy industry. On this basis, the analysis of the development of new energy industry in the process of the Local Government behavior, not only can gaze at China's new energy industry policy effectiveness and problems in the theory, but also provide constructive reference for making scientific and rational new energy policy based on the development of the Local Government behavior in a practical sense.

2. The Local Government New Energy Policy List and Emphasis

2.1. Reasons for Choosing Hebei Province

The paper selects the Hebei province as a local representative to analyze the

formulation and focus of the Local Government new energy policy. Resource structure of the traditional energy such as fossil fuels in Hebei province is abundant, but the heavy reliance on fossil fuels, atmospheric pollution, resource depletion pressure intensified and the adjustment of energy structure put forward the requirements for environmental protection. In recent years, Hebei Province is committed to optimizing the energy structure and adjusts the economic structure, photovoltaic, wind energy and new energy vehicles developed rapidly. New renewable energy power generation capacity in Hebei province is 2.25 million KWH in 2014, up to 114.54 billion KWH, accounted for 20.5% of the province's power capacity¹. At the same time, the country's largest new energy automotive industry base settled in Dingzhou². Therefore, the choice of new energy industry in Hebei Province as a sample case has a certain scientific basis.

According to incomplete statistics, the amount of directly affiliated institutions in Hebei province to develop new energy policy is 22, which ignores the forwarding state ministries files and the new energy policy below the provincial administrative level, which blurs the prefecture level and the administrative level, directly expressed as provincial policy samples. The sample covers the period from 1997 to 2016, and covers major areas including photovoltaic, the new energy vehicles and wind energy.

2.2. The Emphasis of the Local Government New Energy Policy

From the perspective of the policy formulation and promulgation of Hebei Province, there are at least eight departments in 22 policy documents. The policy promulgated by the provincial and ministerial departments is basically one, and the policy is basically a single department text. The number of Hebei provincial government policy text reached 43.5%, followed by the Provincial Development and Reform Commission accounted for more than 17.4%, the overall distribution is uneven, and the gap is relatively large. The provincial government is the leading unit of policy-making, the functional departments are the auxiliary units of its policy implementation measures, 12 specific policies or regulations around the 10 industry planning, targeted according to the overall development of the industry policy deployment. Detailed apartment distributions are shown in **Table 1**.

22 policy documents are mainly distributed in the key areas including photovoltaic, wind energy and the new energy vehicles, involving the sub-industry production, investment, consumption and other sectors, basically formed a "Hebei Province New Energy Development and Utilization Management Regulations", "Hebei Province Electric Power Regulations" and other laws and regulations as the guide, "Hebei Province New Energy Industry 12th Five-Year Development Plan" and "other industrial planning as the basis," taking on "The Electric Car Electricity Price Policy Announcement" such as segmentation initi-

¹The data comes from An Investigation Report on the Investment Opportunity in China's New Energy Industry in 2016-2020.

²Resource comes from <http://www.d1ev.com/36210.html>.

Table 1. The distribution of the new energy policy of the Hebei government during 1997-2016.

No.	Name	Amount	Proportion
1	Provincial Government	10	43.50%
2	Provincial Development and Reform Commission	4	17.40%
3	Provincial People's Congress	2	8.70%
4	Provincial Price Control Administration	2	8.70%
5	Provincial Science and Technology Department	2	8.70%
6	Provincial Finance Department	1	4.30%
7	Provincial Design Department	1	4.30%
8	Provincial Transportation Department	1	4.30%

Data sources: Author sorts out documents according to Hebei Province Government website.

atives as a means of relatively complete system of new energy policies. Three areas of policy text cover six policy-oriented, including industry planning, market promotion, price guidance, legal guidance, business support and project management. Among them, the policy focus clearly is the industry planning, accounting for 54.5% of the total amount of policy text, followed by market promotion, accounting for 18.2%. Detailed are shown in **Table 2**.

3. The Main Means and Objectives of the Local Government Behavior

3.1. The Main Means of the Local Government Behavior

The tax system reform is an important turning point in the event of the Central Government and the Local Government behavior differentiation, in the form of a single performance evaluation, local officials rely heavily on economic growth industries and emerging industries. The main form of the Central Government's support for emerging industries is based on macro control, focusing on policy support, emphasizing the guiding role of demonstration projects. In addition, the Central Government in the future is more inclined to introduce new energy development strategy plan from the top-level design point of view, in order to co-ordinate the coordinated development of new energy industries across the country. And the Local Government has obvious different, on the one hand, to implement the central policy initiatives, and according to local specific circumstances make appropriate localization policy, the other side is focus on the micro intervention, the existence of traditional investment behavior, thus resulting in a large number of project approval documents came into being.

3.1.1. Prior Approval and Investment Promotion

Investment promotion and capital introduction is taking the advantage of the policy of the Local Government through land since the reform and opening up, the fiscal and taxation policies to attract foreign companies to invest in local is a common behavior. Hebei gives full play to its own advantages of solar energy,

Table 2. The central government's new energy policy oriented frequency statistics during 1997-2016.

NO.	Policy Orientation	Amount	Proportion
1	Industry Planning	12	54.50%
2	Market Promotion	4	18.20%
3	Electricity Price Guidance	2	9.10%
4	Law Guidance	2	9.10%
5	Enterprise Support	1	4.50%
6	Project Management	1	4.50%

Data sources: Author sorts out according from Hebei Province Government website.

wind energy, biomass energy and other natural conditions and the advantages of a more perfect automobile production chain, actively introduce foreign enterprises to invest in Hebei. For example, in April 2015, a total investment of 600 million yuan of the first domestic zero carbon energy Internet area settled in Chengde Weichang Manchu Autonomous County of Mongolia.

3.1.2. Policy Support and Precisely Focus

The Local Government' more influential and persistence means to support emerging industries are sound policy system. For local governments at all levels of investment in terms of the preferential conditions when compared to the invisible, the provincial government policy is more evidence to follow. According to the policy guidance of the new energy policy of the Hebei provincial government, the paper analyzes the contents of the 22 new energy policies in the sample, and classifies the relevant methods used in each policy-oriented text and lists the relevant policies, (Table 3 for details). Hebei provincial government's new energy policy mainly include administrative command, administrative guidance, project demonstration and the fiscal and taxation policy, the policy guidance of different collocation is relatively reasonable, tend to be in a specific policy guidance under the integrated use of various means to maximize utility.

3.2. The Purpose of Local Government Behavior

The special position of the dual agency of the Local Government is not only consistent with the behavior of the central government, but also different from the behavior of the Central Government under the purpose of the implementation of the new energy policy. Taking new energy policies by the Central Government balance industry, adjust the structure of energy consumption, reduce the pressure of international climate, change the tone of both the local industrial structure adjustment, drive economic growth and promote employment assessment requirements.

3.2.1. Implement the Central Government's New Energy Policy

As the Central Government in the local implementation of the specific implementation, the Local Government's most important function is to issue the cen-

Table 3. The new energy policy of the Heibei province.

Policy Orientation	Policy Approach	Typical Policy	Regulation Details
	Administrative Order	Target control Hebei Electric Power 12 th Five-Year Development Planning (2011-2015)	New energy power generation accounts for the proportion of total power generation capacity in the province will reach 15% by 2015
		Mandatory usage Hebei Province Urban Development Plan for Public Transport (2013-2017)	By the end of 2014, the mandatory retirement of all more than 6 thousand yellow buses replaced by new energy buses
Industry Planning	Financial Subsidy	Guidance on Promote the Development of Photovoltaic Industry Opinions of the Hebei Provincial People's Government on Speeding Up the Cultivation and Development of Strategic Emerging Industries	Province special funds subsidies granted in the industry development
	Project Demonstration		Construction of a number of wind power blades, wind power machine industrial base
Market Promotion	Administrative Order	Hebei Province Civil Building Energy Conservation Regulations	Qualified residential building under 12 layer, centralized hot water supply to enforce the solar-thermal systems in public buildings
	Taxation Relief	Opinions on Accelerating the Development and Popularization of New Energy Vehicles	Introduction stage provincial finance of new energy bus and public services by car users in the province subsidies for new energy vehicle
Enterprise Support	Project Demonstration	Circular on Printing and Distributing the Demonstration Project of Energy Supply Facilities for New Energy Vehicles in Hebei	Shijiazhuang and other four cities as a pilot city
	Administration Instruction	Guiding Opinions on Encouraging and Guiding Private Capital to Further Expand Investment in the Energy Sector	Support private capital into the new energy and renewable energy industry
Others	Administrative Order	Omit	Omit

tral new energy policy essence, forward the central government new energy policy to ensure that the national macro-control and micro-intervention effect smoothly. The Central Government from two aspects of the overall industry development and the market situation to revise new energy policy, the Local Government is the executor of the central policy and policy for the appropriate modifications, to ensure that the Central Government's new energy policy in the implementation process smoothly.

3.2.2. Meet the Needs of Local New Energy Industry Development

On the basis of the implementation of the central policy, the Local Governments often choose to formulate local policy, and even expand the scope and intensity of the expansion policy, so as to better to support the development of new energy industry. At the same time, since the reform of the tax system, the Local Government has formed the economic pressure of independent decision-making and finance and taxation, the power and pressure coexist. The new energy industry has become a new choice for stimulating the employment growth and creating the economic growth pole. Comprehensive security measures urged local new energy industry become a star industry.

3.2.3. Pulling GDP Growth and Boost Achievement Appraisal

The new energy industry takes into account the economic development and the concept of green environmental protection, has become the “cosset” of the Local Government development. After all, the current concept of GDP growth is deeply rooted in the minds of local officials, although in the process of development, the new energy belongs to the dawn of the sunrise industry. But the Local Government by offering “free preferential tax + fiscal subsidies” to promote new energy projects, boosts GDP and creates jobs in order to achieve the purpose of political achievements.

4. Method

In order to investigate the social public satisfaction on the Local Government new energy policy, this essay takes the form of questionnaires. The poll gave out 30 questionnaires, and the amount of effective questionnaires is 30. The investigation object is the social public, and assigned randomly. The questionnaire is single choice, and the results of the analysis take the combination of qualitative and quantitative way. The method of quantitative analysis is analytic hierarchy process and fuzzy mathematics.

4.1. Results of Questionnaires

In terms of background, the sex ratio of respondents is respectively 55.73% and 44.27%, mainly ages of 20 to 30 (81.45%), students and PhD have a relatively high percentage of the respondents, reached 69.72% and 72.56% respectively. In cognition on new energy products, about two thirds of respondents are not engaged in new energy industry, and know nothing about new energy industry. But, few respondents have bought new energy products, 78% of respondents have used those products. It is easy to understand 56.94% of respondents know something about the new energy subsidy policy. In terms of social public evaluation and satisfaction on the Local Government new energy policy, the whole is comparatively satisfied. In order to more comprehensively evaluate the public satisfaction on the Local Government new energy policy, the essay focuses on five aspect of energy security, energy-saving and emission reduction, industrial structure, economic development and energy consumption. The social comprehensive evaluation on the energy policy will be analyzed in two steps. First of all, this essay uses the Analytic Hierarchy Process (AHP) to get energy security, energy-saving and emission reduction, industrial structure, economic development, energy consumption in the proportion of new energy policy. Secondly, this essay uses the Fuzzy Mathematics Method to get the social comprehensive evaluation on new energy policy. In terms of social public evaluation of government intervention on the development and future expectations of new energy industry, 87.44% of respondents agreed with the Local Government to keep intervention on this field. All respondents think government intervention is helpful to improve the social cognition of new energy products, and the future development of China new energy industry is optimistic.

4.2. Application of Fuzzy Matrix

Using the Analytic Hierarchy Process (AHP) to determine the weight of all aspects of the new energy policy, the essay makes energy security, energy-saving emission reduction, industrial structure, economic development, energy consumption the status of the weight in China's energy industry policy set to ϖ_1 , ϖ_2 , ϖ_3 , ϖ_4 and ϖ_5 . Measure weight vectors of new energy policy are $(\varpi_1, \varpi_2, \varpi_3, \varpi_4, \varpi_5)$, $\sum \varpi_i = 1$, $\varpi_i \in (0,1)$. Using the analytic hierarchy process to determine the weights of the new energy policy measures are as follows.

Energy security, energy saving and emission reduction, industrial structure, economic development, five aspects of energy consumption in China's new energy policy accounted for position of relative importance ranking survey data. In the survey data, the respondents believe that the most important ranking is 1, the least important ranking is 5, and so on, according to the importance of the original survey data to carry out the weight of the order of the two encoding. The corresponding to the 10, 2 corresponding to the 7, 3 corresponding to the 5, 4 corresponding to 3, 5 is 1; for example, the importance order of the order 1, 3, 5, 4, 2 corresponding to the weight of the two encoding values are 10, 5, 1, 3, 7. Make energy security, energy-saving emission reduction, industrial structure, economic development, energy consumption two aspects of the 5 aspects of the weight of the encoding values are added to the overall ranking. Energy security, energy-saving emission reduction, industrial structure, economic development, energy consumption two aspects of the 5 aspects of the weight of the 5 times encoding values were 560, 824, 940, 900 and 1069, indicating that the relative importance of the energy industry in order to sort the order of energy consumption, economic development, industrial structure, energy-saving emission reduction, energy security. The relative importance of the 5 aspects of energy policy is formed by the two comparison matrix. According to the analytic hierarchy process, the choice of the scale is 1 - 9, which is the difference between the maximum and the minimum value of 9. Get relative importance matrix, see **Table 4**.

Table 4. The relative importance between the new energy policies in all aspects of the two two comparison matrix.

	Energy Security	Energy Saving Emission Reduction	Industrial Structure	Economic Development	Energy Consumption
Energy Security	1	1/4	1/6	1/5	1/9
Energy saving Emission Reduction	4	1	1/2	1/3	1/4
Industrial Structure	6	2	1	1/2	1/2
Economic Development	5	3	2	1	1/3
Energy Consumption	9	4	2	3	1

To determine the weight of each aspect of the new energy policy, the two comparison matrixes of the relative importance of the various aspects of the new energy policy come to energy security, energy saving and emission reduction, industrial structure, economic development, energy consumption of the 5 aspects of weight vector is $A = (0.09, 0.16, 0.21, 0.22, 0.32)$.

On the basis of determining the weight of each aspect of the new energy industry, the comprehensive evaluation of the new energy policy by using the fuzzy mathematics method, the social evaluation of the new energy policy in every aspect of satisfied, comparatively satisfied, not quite satisfied, dissatisfied. According to the social assessment of the energy security of the new energy policy, 12% of the respondents said they were satisfied, 13% of the respondents said they were comparatively satisfied, 36% of the respondents said they were not quite satisfied, 39% of the respondents said they were not satisfied, thus get the evaluation of the new energy policy security satisfaction fuzzy vector is $(0.12, 0.13, 0.36, 0.39)$. In the same way, it can be concluded that energy saving and emission reduction, industrial structure, economic development, and energy consumption are evaluated by fuzzy vector are $(0.11, 0.22, 0.38, 0.29)$, $(0.19, 0.21, 0.41, 0.19)$, $(0.35, 0.23, 0.21, 0.11)$, $(0.14, 0.29, 0.39, 0.18)$. Get comprehensive evaluation matrix of new energy satisfaction of the Local Government.

$$R_o = \begin{pmatrix} 0.12 & 0.13 & 0.36 & 0.39 \\ 0.11 & 0.22 & 0.38 & 0.29 \\ 0.19 & 0.21 & 0.41 & 0.19 \\ 0.35 & 0.33 & 0.21 & 0.11 \\ 0.14 & 0.29 & 0.39 & 0.18 \end{pmatrix}$$

The new energy policy of the Local Government in all aspects of weight vector and new energy policy satisfaction evaluation matrix, and to get the new energy policy satisfaction evaluation vector:

$$\begin{aligned} AOR_c &= (0.09, 0.16, 0.21, 0.22, 0.32) \begin{pmatrix} 0.12 & 0.13 & 0.36 & 0.39 \\ 0.11 & 0.22 & 0.38 & 0.29 \\ 0.19 & 0.21 & 0.41 & 0.19 \\ 0.35 & 0.33 & 0.21 & 0.11 \\ 0.14 & 0.29 & 0.39 & 0.18 \end{pmatrix} \\ &= (0.19, 0.26, 0.35, 0.20) \end{aligned}$$

If the essay further calculate the social satisfaction of the new energy policy, we will be satisfied, comparatively satisfied, not quite satisfied and not satisfied with the value of +4, +2, -2, -4, then it can get the social satisfaction of the new energy policy of the Local Government. The evaluation value is -0.1201. It can be concluded that the new energy policy of the Local Government is not quite satisfied.

5. Conclusion

The new energy industry has been developing rapidly under the impetus of the Local Government, but in the questionnaire results show that the social public

has some doubts about the implementation of the local policy. Therefore, the Local Government should pay more attention to the sustainability of industrial development in the future, and reduce the utilitarian; the Local Government should follow the principle of seeking truth from facts in the formulation of local policies and avoid excessive homogeneous competition; the Local Government as a representative of the interests of the Central Government and implementation of policies, should earnestly implement the basic requirements for the implementation of central policies, and jointly promote the new energy industry in accordance with the central planning and to achieve orderly, rational development. However, this paper does not make specific research on implementation of the policy, so the policy performance will be more in-depth analysis in the future.

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