

Research on the Construction of Rural Energy System in Tianjin

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Abstract—With the development of China's economy and its sheer size, the increasingly pursuit of a better life, people's demands for the environment and health are getting bigger and bigger. Due to traditional lifestyles and habits, rural people still use unclean and Non-environmental power sources. Most of them use coal and firewood to heat and cook, which seriously affects the development and progress of rural economic and social development.

The construction of rural energy systems is becoming increasingly urgent. In order to study this system in Tianjin, we selected five representative villages in Tianjin. Through interviews and questionnaire surveys, we summarized the current situation of rural energy use in Tianjin and found out many problems such as imperfect systems. We have developed corresponding countermeasures for the construction of it.

In order to improve the environmental quality of rural areas, study and explore the construction of rural energy system, and help Tianjin rural revitalization, we conducted research on five suburban rural areas in Tianjin, conducted research and study through different typical villages, and fully understood the specific use of rural energy in Tianjin. The paper will explore countermeasures for the construction of rural energy system in Tianjin.

Keywords—rural energy system; construction; environmental protection; rural revitalization

I. ANALYSIS OF THE CURRENT SITUATION OF RURAL ENERGY IN TIANJIN

A. Tianjin Rural Energy Related Policies Have Been Promulgated

To build a rural energy system, Tianjin has introduced a series of policies to guide and support the construction of a rural energy system. In March 2018, Tianjin Rural Energy Office issued an announcement: Coordinating and promoting the comprehensive development and utilization of rural renewable energy; formulating and developing rural renewable energy development plans and technology promotion plans; and researching and promoting the development and utilization of rural renewable energy Policies, measures, technical standards and norms, and guide implementation, and guide the safety supervision of rural renewable energy utilization projects[1]. At the same time, the Tianjin Municipal Government issued the "Three-Year Blue Sky Defence War" (2018~2020) to promote the clean and warm heating of residents in winter, reduce the total consumption of coal, deepen the control of coal-fired facilities, vigorously develop non-fossil energy, and strengthen the supply of natural gas. Capacity, improve energy efficiency, improve power supply

capacity[2], improve rural environmental quality, and help Tianjin rural revitalization.

B. The Single Energy Supply Structure is Gradually Improved

Since the implementation of rural energy management, Tianjin has vigorously promoted structural emission reduction by adhering to the prevention and control of the source. In 2018, it has completed the renovation of 238,000 households in winter. In 2019, as the key year for the three-year action plan for the Blue Sky Defence War, Tianjin will accelerate the four major structural adjustments and promote the replacement of the remaining 500,000 rural residents in the city with clean coal. In 2020, coal accounted for the proportion of primary energy consumption. 45% or less[3]. With the upgrading of power grid operations, such as the United Village began to use electric heating, Daliutan Village also used ducted heating, but the single energy supply structure of rural areas in Tianjin has not been fully improved.

C. Rural Energy Infrastructure Construction is Steadily Advanced

In the survey, we found that the main energy sources in rural areas of Tianjin are pipeline natural gas (gas), electricity, geothermal heat and waste heat from surrounding enterprises. For example, the fried rice shop in Xiqing District, which has a relatively fast urbanization process, has completely used pipeline natural gas and electricity. There is almost no difference in the way domestic energy is used and urban residents; Daliutan Village in Xiqing District and Beihe District Line in the suburbs. In the village of Village 2, there is already a planned natural gas construction plan. Daliutan Village also uses the energy of the nearby thermal power plants to provide the villagers with ducted heating; according to the introduction of the village cadres of the other two natural villages, the unified use of pipeline natural gas and pipeline gas It has been included in the government's plan but has not yet been implemented. The construction of rural energy infrastructure network has been smoothly advanced and is becoming more and more perfect.

D. The Concept of Energy Use of Farmers is Constantly Changing and Improving

According to the information, the air quality in Tianjin and rural areas continued to improve significantly. The concentration of pm2.5 in the air decreased by 16.1% in 2018 and 2017. This shows that rural energy management has made great achievements, and farmers' energy the concept of use is constantly changing and improving. Despite improvements in the role of propaganda in recent years, the degree of improvement is low, and the lack of awareness of the rural

energy system needs to be continuously improved and adjusted.

II. THE PROBLEMS IN THE USE OF RURAL ENERGY IN TIANJIN

After investigation, we found that although the government departments have implemented some rural power problems, although some effects have been achieved, there are still some problems in the rural energy rectification work.

A. *The Management System is not Perfect, and the Remediation Effect is not Obvious*

In the survey, we found that the government supervision departments have insufficient supervision on the rural areas that still use coal, and farmers who continue to use coal and firewood cannot be rectified in time. The grassroots rural cadres are not well managed, they have not actively performed their duties, and they lack responsibility. Management is just passing through. The villagers say that coal is changed to electricity, but coal is still used in the back. Secondly, although many energy use preferential policies and differentiated reward policies have been formulated, the reward and punishment system is too general, which leads to problems such as difficult implementation of reward and punishment policies and poor implementation.

B. *The Rural Energy System is Unreasonable and Lacks New Energy Development*

After visiting the survey, we found that due to the high price of natural gas and electric energy, the villagers mostly burn coal. The construction of rural new energy in Tianjin is still in its infancy, the construction experience is insufficient, and the overall construction work measures are not perfect. At this stage, it is unable to provide effective support for the development of energy construction activities in rural areas. At the same time, due to the geographical environment of each village, the development of new energy has been limited.

C. *Rural Energy Infrastructure Network is Imperfect*

Although the rural energy infrastructure construction in Tianjin has made great progress, there are still problems that are not perfect. Taking the case of the river 1 and 2 villages in Shuangkou Town, Tianjin as an example, the village cadres pointed out that according to the government regulations, coal was converted to electricity in early 2019. Although there was a government-planned natural gas construction plan, it was not due to the problem of insufficient funds. Can be implemented effectively. The stoves and heating facilities used by the villagers have low thermal efficiency, low utilization rate, and certain environmental pollution, which is also a waste of resources. In some rural areas, there will be a certain economic burden for installing gas and heating pipes. When dealing with these aspects, there will be a situation in which one eye is closed.

D. *Farmers' Environmental Protection Concepts and Awareness Need to be Improved*

In the five typical villages surveyed, most of them are based on burning coal balls, which are used for heating and cooking. A small number of farmers use electricity as an energy source for daily life. Farmers who use briquettes are

older than older farmers, and they are still using coal because of their years of living and consumption habits. Take Sixiaotun Village, Liangwangzhuang, Jinghai District, Tianjin as an example. The villagers said that the village committee is carrying out coal-to-gas (electric) clean energy heating work, but most of them still use coal and firewood as the main fuel. Gas pipelines have been built but not fully covered and used. Coupled with the high price of gas and electricity, many villagers are not very willing to make changes.

III. COUNTERMEASURES AND SUGGESTIONS FOR BUILDING TIANJIN RURAL ENERGY SYSTEM

A. *Improve Relevant Laws and Regulations and Formulate Clear Implementation Rules*

Establishing and improving relevant policy systems is the guarantee for building a rural energy system. Improve the management system, formulate scientific and rational fund allocation methods, allocate funds according to different standards and special requirements for different types of villages or towns, and require multi-party supervision; clarify the division of responsibilities, establish responsibility at all levels; formulate rural renewable energy development support Policies; formulate energy infrastructure development policies for rural power grids, pipe networks, etc.; formulate policies to encourage the use of clean energy, accelerate the process of coal to electricity, coal to gas, coal to geothermal, and biogas utilization; accelerate the construction of rural energy services and energy statistics systems .

B. *Optimize Rural Energy Supply Structure and Promote Rural Energy Consumption Upgrading*

Combined with the actual situation of rural areas in Tianjin, different energy use structures and models are adopted. In the suburban countryside where natural gas is used, "natural gas + solar energy" heating heating mode can be adopted; in rural areas where natural gas is not available, "electricity + solar energy" and "solar + biomass energy" and modes can be adopted. In remote rural areas, the "biomass+" model should be emphasized. Tianjin's rural areas rely on large cities and coastlines, and have their own unique resource advantages, such as tidal energy. There are more land for cultivating and cultivating along the beach. Solar energy, wind energy, etc. should be developed, and the surrounding enterprises should be used to provide some residual heat for the villagers. Take farmers' lives and agricultural production, continuously optimize the rural energy supply structure, and promote the upgrading of rural energy consumption.

C. *Increase Investment in Rural Energy Infrastructure Network Construction*

Give full play to the financial resources of government enterprises and individual farmers. First, the government should adopt diversified fiscal means to broaden the sources of funds for rural renewable energy facilities through channels and methods such as taxation, debt, subsidies, transfer payments, policy credits, asset capitalization, and development funds, and guide the market and the public. Investment and financing; Secondly, in terms of social participation, it encourages diversified funds to invest in the construction of rural energy infrastructure, encourages the participation of

social groups, enterprises and farmers, and increases investment in rural energy infrastructure network construction.

D. Transforming Farmers' Energy Awareness and Environmental Protection Concepts

Villagers are the mainstay of rural energy use. First of all, we must strengthen the awareness of the villagers and establish a sense of ownership. The government should make full use of all conditions to increase publicity and education, so that rural residents in the suburbs are fully aware of the responsibility of using energy in the standard, and at the same time strengthen legal education and raise awareness of each villager. And ideas. For example, the village committee can hold regular symposiums on life energy appraisal and experience exchanges, let the villagers communicate with each other, and continuously improve the peasants' energy awareness and environmental protection concepts.

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