Study on High Quality Development Path of Clean Heating in North China

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Abstract. Since the implementation of the clean heating plan, the 15 northern provinces have actively promoted this work with remarkable results. However, since its implementation, there are still many problems, which urgently need to optimize the technical route and specific policy orientation. In order to ensure the high-quality development of clean heating work, this paper designs the optimization path of clean heating, puts forward the optimization direction and key points from different dimensions and levels, and provides support for the promotion of clean heating work at all levels.

Introduction

The problem of winter haze is related to the national economy and people's livelihood. Clean heating, as an important way to alleviate the problem of winter haze, has been raised to the height of national strategy. In December 2016, Chinese President Xi Jinping stressed at the 14th meeting of the Central Financial and Economic Leading Group that clean heating should be promoted in winter in northern China. He pointed out that according to the principle of enterprise-oriented, government-driven and affordable for residents, the proportion of clean heating should be increased by using clean energy as much as possible. In 2017, ten ministries and commissions jointly issued the "Clean Heating Planning for Winter in North China (2017-2020)", which clearly defined the planning objectives of clean heating. Since then, the "Three-year Action Plan for Winning the Blue Sky Defense War" issued by the government has put forward the principles of "electricity is suitable, gas is appropriate, coal is appropriate, heat is hot".

Clean heating concerns the battle against pollution, the blue sky and white clouds, and the people's warm winter. Since the proposal of clean heating, from the Central Committee of the Party, the State Council to governments at all levels, and then to all sectors of the society, the clean heating project has achieved remarkable results. Relevant research has also been carried out, and more academic achievements have been achieved. For example, the paper [1-2] expounds the development mode of clean heating from the perspective of energy development. Literature [3-5] makes a comparative analysis of clean heating methods from a technical point of view. However, there is no systematic academic viewpoint on the follow-up development path of clean heating.

Current Situation of Clean Heating

From the point of view of heating mode, the current heating mode includes coal-fired central heating, Gas-fired central heating, non-energy storage electric heating, heat pump, geothermal and other forms.

According to the target completion value of clean heating planning, the implementation of clean heating in the northern region is good as a whole, exceeding the planning expectations. By the end of 2018, the total clean heating rate in northern China had reached 55%, 21 percentage points higher than the planning base year (2016), 5 percentage points higher than the planning target (50%) in 2019, and for the first time exceeded the proportion of bulk coal combustion. Among them, clean coal-fired, natural gas and electric heating are well completed, and renewable energy heating is slowly promoted. As far as electric heating is concerned, the development of centralized electric heating is relatively slow, while the development of decentralized electric heating is rapid.

From the effect point of view, since the implementation of clean heating, the atmospheric ecology has improved significantly. The ambient air quality in key areas has been improved significantly. The average concentration of PM2.5 in Beijing, Tianjin, Hebei, Yangtze River Delta and Pearl River Delta decreased by 48%, 39% and 32% respectively compared with that in 2013. PM2.5 in Beijing dropped dramatically, from 89.5 micrograms/cubic meters to 51 micrograms/cubic meters, a decline of 43%. Total emissions of major atmospheric pollutants have decreased significantly. Since 2013, total emissions of nitrogen oxides and sulfur dioxide in China have decreased by 28% and 26%. The area of acid rain decreases year by year. In 2013, the area of acid rain in China accounted for 10.6% of the total land area. In 2018, the area of acid rain dropped to 5.5%, a decrease of nearly 50%. In 2018, carbon dioxide (CO2) emissions per unit GDP of China decreased by 45.8% compared with 2005, and reached and exceeded the target of reducing CO2 emissions per unit GDP by 40%-45% in 2020.

The Main Problems in the Analysis of Impediments to Clean Heating

The economic efficiency of some clean heating methods is poor, the government subsidies are not in place, and the effectiveness of the transformation needs to be consolidated. Without subsidies, the economy of electric heating is relatively poor. Governments at all levels subsidize the purchase and operation costs of heating equipment from coal to electricity. Due to the limited financial resources of the government, the subsidies in some areas are not in place. Compared with other subsidized heating methods, the economic efficiency of electric heating is still not high. With the increasing area of electric heating and the increasing financial pressure of the government, subsidies are facing the risk of decline. Some users have worries about unsustainable subsidies, resulting in a situation of "changing instead of using, basically not using", resulting in waste of resources. With the development of clean heating into deep water area, it will be more and more difficult to control. The time limit of central subsidy for clean heating pilot projects in North China is only three years. The subsidy for the first batch of 12 urban pilot projects will end in April 2020. It is an urgent problem to optimize the existing subsidy policy and the effect of bulk coal control in the post-subsidy era. 2019 is the middle year of the Northern Clean Heating Planning. According to the current progress, in 2019, we still need to intensify our efforts and not relax, in order to ensure the smooth completion of the planning objectives in the later period.

In clean heating, the importance and scientific analysis of resource endowment are not enough. In 2017, the growth rate of gas consumption caused by "coal to gas" exceeded the gas supply capacity of some areas, and the construction of gas storage facilities was out of line with the target task of "coal to gas" project, which led to the shortage of gas supply in some areas.

There are many problems in biomass heating, such as lack of complete specialized raw material collection, storage, transportation and supply system, difficult to meet the needs of large-scale utilization, lack of emission standards and so on.

Research on High Quality Development Path of Clean Heating

Optimizing Heating Technology Path

It is necessary to optimize the technical route of clean heating based on the principle of lowest operating cost in combination with the previous work practice.

The promotion of electric heating should give priority to areas with strong grid structure, strong power supply capacity, relatively sufficient government financial funds and affordable economy. Government and enterprise users such as schools and hotels belong to non-continuous heating, which has short running time and low rigidity. Compared with residential communities, it has a stronger price bearing capacity and can be the preferred object of promotion of centralized electric heating. For dispersed villages, the electric heating of dispersed heat pump can be popularized.

In the aspect of gas heating, we should speed up the construction of matching gas storage and peak shaving facilities, enhance the city's emergency gas storage capacity, ensure adequate gas resources,

promote the interconnection of natural gas pipelines, make the rational allocation of natural gas resources from north to south, east to west, and ensure that there is no gas shortage.

In the aspect of clean coal-fired, without financial subsidies, it is difficult for coal-fired boilers to carry out ultra-low emission renovation, thus meeting the clean heating standards. It is necessary to further eliminate backward production capacity and implement ultra-low emission standards.

In terms of biomass, we should establish and improve the management of renewable energy heating development and fiscal and taxation financial policy system.

Much energy complements each other and wisdom heating becomes the main field. The single energy heating has become the past, and the multi-energy complementary efficiency will be advocated in the future. The supply and demand coordination of biomass, industrial waste heat utilization, gas, electricity and other heat sources has become a trend of market operation. In the future, we should put clean heating into the overall energy demand analysis, and consider electricity, heating, cooling, gas and oil as a whole.

Optimizing the Path of Policy Subsidies

In terms of price, efforts should be further intensified in peak-valley time-of-use price, step-by-step price and electricity market-oriented transaction to optimize and improve the "coal to gas" gate price policy.

As for subsidy, we should optimize the existing government subsidy, and establish a fixed output subsidy standard classified according to the economic level. Resident subsidy should establish a differentiated subsidy standard, and propose an exit mechanism for operating subsidy. Enterprise subsidy should give priority to loan support, price and tax preferences.

In terms of mechanism, industrial investment funds should be established and private enterprises should be given priority. At the same time, we should strengthen field research and information disclosure, improve the target assessment methods and evaluation mechanism and information feedback mechanism.

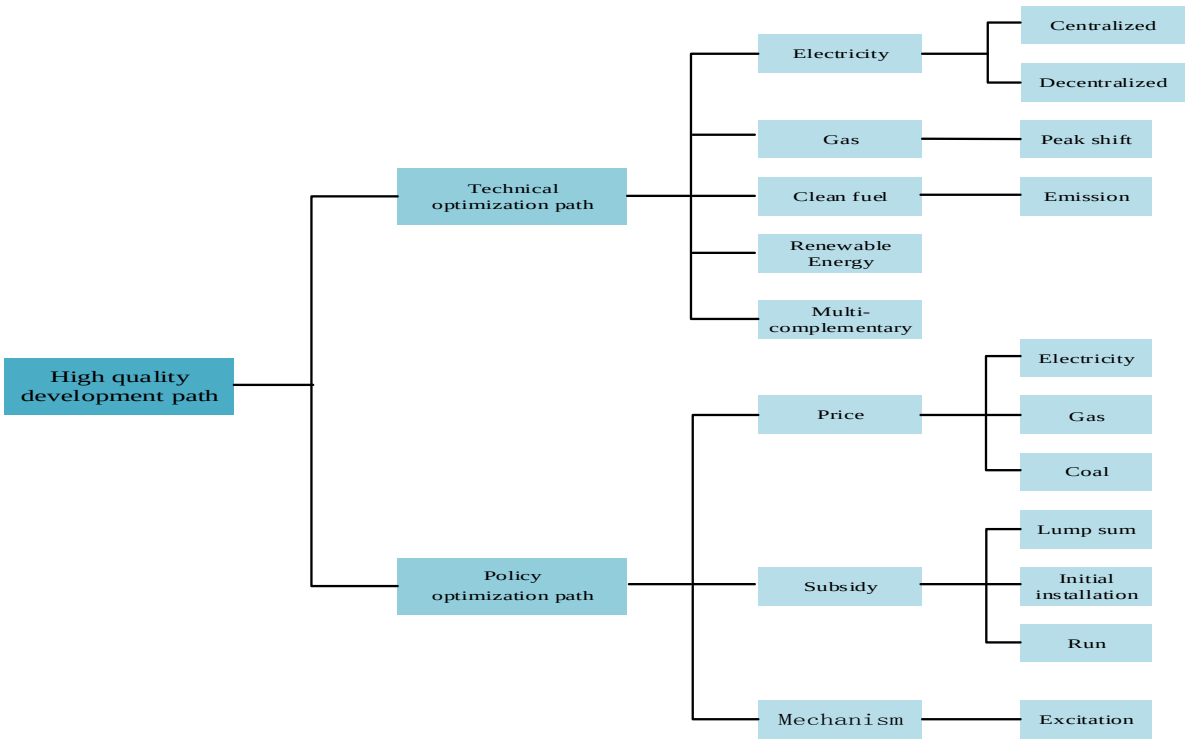

Figure 1. Diagram of High Quality Development Path for Clean Heating

How to evaluate the performance of clean heating operation is a difficult problem when promoting clean heating work in various places. Therefore, based on field research, this paper puts forward an index system for evaluating the operation performance of clean heating work in different areas. These

indicators can measure the operation of clean heating, but also guide local governments to carry out high-quality development of clean heating related work.

Table 1. Clean Heating Assessment Index System

Energy Supply Guarantee		Natural Gas Supply Guarantee	
		Power Supply Guarantee	
Establishment of Natural Gas Reserve by Government and Town Gas Enterprises			
Rationality of Technical Route			
Heating with Renewable Energy Technology			
Management and Use of Financial Funds		Funding in place	
		Progress of fund allocation	
Supporting policies			
Target accomplishment	Clean heating	City Proper	Clean Heating Rate
			Reconstructed area
			Number of renovated households
		Counties and rural areas under the jurisdiction of the urban-rural fringe	Clean Heating Rate
			Reconstructed area
			Number of renovated households
	Building energy efficiency	City Proper	Area or proportion of energy-saving renovation
			Number of energy-saving renovation households
		Urban-rural fringe and county under its jurisdiction	Area or proportion of energy-saving renovation
			Number of energy-saving renovation households
		countryside	Area or proportion of energy-saving renovation
			Number of energy-saving renovation households
		Building Energy Efficiency Increase Rate	
Decrease in PM2.5 concentration			
Financial affordability			

Suggestions

Firstly, we should strengthen planning guidance and carry out high-standard research on the planning and implementation of clean low-carbon heating; secondly, we should take the replacement of loose coal as one of the main assessment indicators of clean low-carbon heating; thirdly, the price of clean heating is on the high side, and we should accelerate the market-oriented reform of electricity, oil and gas and heating; fourthly, we should do a good job at the same time and synchronize it. Promote the transformation of building thermal insulation. Fifth, we should try our best to solve the heating problem in various ways. At the same time, we should pay attention to the interaction between various energy varieties. We can try to promote the whole heating mode mainly in one way and supplemented by other ways.

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