

Analysis of the Development Status and Industrial Policies of the Hydrogen Energy Industry in Zhangjiagang City

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Abstract: China is currently building hydrogen refueling stations in Beijing, Shanghai, and Zhengzhou. Moreover, there are currently numerous medium-sized hydrogen refueling stations under construction with a capacity of over 400KG/D. From planning, design, construction to operation, hydrogen stations with long-term operational capabilities are required to analyze and develop the system, ensuring the scientific nature of technology and the economic efficiency of operation. The core facilities of the hydrogen refueling station are mainly gas storage tanks, air compressors and various control systems. At present, the existing hydrogen production stations and core facilities under construction mainly adopt the form of "import+domestic products", basically establishing the conditions for national production. But it is necessary to strengthen the implementation of current standards, the establishment of inspection instruments, and supervision and management.

Keywords: Hydrogen Energy Industry; Industrial Policies; Zhangjiagang.

1. Introduction

Hydrogen fuel cell vehicles are increasingly receiving attention from relevant government agencies and enterprises in China due to their diverse renewable energy sources, short filling times, and high zero carbon emission risks [1]. After the 2008 Olympics, fuel cell buses operated approximately 2600 times with hydrogen gas. The hydrogenation capacity is approximately 22 tons. At the 2010 Shanghai World Expo, fuel cell vehicles and fuel cell ferries had been in operation for nearly 10 months, with a hydrogen refueling capacity of nearly 20000 times (fixed and mobile hydrogen refueling stations) and a hydrogen refueling capacity of 25 tons. In 2011, China's main hydrogen production capacity increased by 3 tons. Overall, the operation of hydrogen fuel cells in China is still in the demonstration stage. Since 2015, hydrogen stations have been successively built in Zhengzhou, Henan, Wujin, Guangdong, and Jiangsu. Yunfu has produced 28 fuel cell buses and started model operation. Shanghai EMU Co., Ltd. and Zhengzhou Mobile Co., Ltd. have announced fuel cell vehicles. At the same time, Japan's hydrogen fuel cell power generation system is also constantly increasing. In October 2016, two MW thermoelectric instruments jointly produced by the hydrogen fuel cell power plant were put into operation by Liaoning Enterprise. This equipment is supplied by the by-product hydrogen gas and constant temperature hot water from the chlor alkali plant [2].

The development of China's hydrogen energy industry has formed a whole industrial chain including preparation, storage, transportation and application, and a large number of Kissinger and other hydrogen energy industries have been formed. The Yangtze River Delta and the Pearl River Delta radiate to the surrounding areas of "Hokkaido". For example, Zhangjiakou City, Hebei Province is building a hydrogen industry demonstration base for the 2022 Winter Olympics in northern China [3]. Last December, Shandong Province constructed a hydrogen energy industry chain and built a "hydrogen valley" that integrates "hydrogen technology park, hydrogen industry park, and hydrogen exhibition business

district". In January of this year, the "Wuhan Hydrogen Energy Industry Development Plan" announced that by 2025, the annual production of the entire hydrogen fuel cell industry chain will exceed 10 billion yuan [4]. At present, China has 10 million tons of natural gas, 3 million tons of natural gas, 3 million tons of oil, 8 million tons of industrial production, and 1 million tons of electrolytic water. Hydrogen production resources and renewable resources have a high degree of economy, which can fully support China's vision of hydrogen industrialization [5]. As of now, 17 provinces in China have provided strong support for the development of their own hydrogen energy industry. Promote the construction and development of one's own hydrogen energy industry through different policy guarantee methods.

2. Current Situation of China's Hydrogen Energy Industry and Industrial Policy Implementation

2.1. Current Situation of China's Hydrogen Energy Industry and Industrial Policy Implementation

Last year, the development speed of China's hydrogen energy industry was getting faster and faster. Local governments have also invested heavily in the hydrogen energy industry. Nowadays, in order to vigorously develop the hydrogen energy industry, local governments at all levels have also invested a large amount of support policies for the hydrogen energy industry. The National Development and Reform Commission and the National Energy Administration have clearly proposed that the strategic direction of hydrogen fuel cell technology innovation is to focus on renewable energy hydrogen production, hydrogen production, and fuel cell technology innovation, and research and development of distributed hydrogen production, storage and transportation, hydrogen production stations, and fuel cell [6]. Innovation in hydrogen production technology, distributed hydrogen production technology, hydrogen storage and transportation technology, and hydrogen fuel cell technology. The Ministry

of Science and Technology and the Ministry of Transport have promoted the development of hydrogen storage and transportation technology, constructed a scale model of hydrogen stations and fuel cell vehicles, and formed a complete set of hydrogen additive technology and industry standard system. In the first half of 2019, policies in the hydrogen energy field in the central and local regions were summarized. The central government has released over 10 hydrogen policy documents [7]. At the same time, 22 cities and districts in 17 provinces have announced national hydrogen policies, including two white papers and one self-service unit. In terms of policy quantity, both the central and local governments attach great importance to the hydrogen industry.

2.2. Development Status of Hydrogen Energy Industry in Zhangjiagang City from a Perspective

2.2.1. Overview of the Development of Hydrogen Energy Industry in Zhangjiagang City

Zhangjiagang City is located in the southeast of Jiangsu Province, with a population of approximately 1.25 million. In 2016, the gross domestic product of Zhangjiagang City exceeded 90 billion yuan, reaching 90.427 billion yuan [8]. Zhangjiagang Economic and Technological Development Zone plans to focus on developing emerging industries such as energy-saving and hydrogen energy vehicles, hydrogen energy, and Changshou biotechnology during the 13th Five Year Plan period, highlighting the development of supporting industries around hydrogen energy. The Zhangjiagang Economic and Technological Development Zone Hydrogen Energy Vehicle Industrial Park was established in 2009 and has been approved as a provincial hydrogen energy vehicle production base, a hydrogen energy vehicle characteristic industry cluster, and a hydrogen energy vehicle and parts industrial park, with a planned area of 20 square kilometers. In May 2017, Zhangjiagang Economic Development Zone was successfully approved as the "National Torch Zhangjiagang Hydrogen Energy Vehicle Characteristic Industry Base" for 2017. 29 local automobile related enterprises have established automobile parts production enterprises and other automobile parts production conglomerates, forming an industrial group that supports the production of key components for energy electric vehicles. The industrial chain includes products such as pure electric buses, pure electric passenger cars, pure electric vehicles, pure electric specialized vehicles, and vehicle bodies. In 2016, the output value of the hydrogen automobile industry in Nanyang exceeded 120 billion yuan [9]. By the end of the 13th Five Year Plan, the production capacity of hydrogen powered vehicles is expected to reach 80000 units, with a total industrial chain output value exceeding 100 billion yuan. Zhangjiagang has a good foundation, leading advantages, and prominent characteristics in the development of the hydrogen economy. It has formed a leading advantage in the construction of the domestic hydrogen energy and fuel cell industry chain, and has formed a certain international reputation and influence in the international hydrogen energy and fuel cell industry.

2.2.2. Porter Diamond Analysis of the Development of Hydrogen Energy Industry in Zhangjiagang City

The analysis of factors affecting the development of the hydrogen energy industry is to analyze the impact of regional

economic, social, political and legal environment on the development of the hydrogen energy industry. Its essence is how the hydrogen energy industry obtains competitive advantages in numerous energy product fields, and the industry will continue to develop in market competition. From the perspective of industry observers, the factors that affect the development of the hydrogen energy industry are deeply grasped. The development of Zhangjiagang's hydrogen energy industry cannot be separated from the local economic, cultural, and technological environment. Local governments need policy and economic support for this industry. Therefore, it is very appropriate to use the structure of the diamond model to analyze the influencing factors of the development of Zhangjiagang's hydrogen energy industry. However, due to different purposes of analysis, the importance of analysis content and description methods also varies. This article focuses on the development of the diamond energy industry, utilizing the structure of the diamond model and the characteristics of the development of the hydrogen energy industry. It conducts an analysis of the impact content of various elements in the diamond model and innovates it. The diamond model is a type of production factor analysis that can be used to analyze production [10]. From the perspective of hydrogen production, it is found that by changing pressure, the proportion of pure hydrogen to adsorbate is the highest, while by changing pressure, The size of the adsorbate is mainly the largest. Absorb pressure. The maximum processing capacity in Japan is 300000m³/h. With the increase of coal gasification and coal production, coal production has been increasing year by year. The scale and cost of coal hydrogenation are becoming larger and lower. In recent years, large-scale industrial hydrogen production and supply have been carried out, mainly through demonstration projects of utilizing surplus water energy through water electrolysis, abandoning wind, light, or urban power valley hydrogen production. Green secondary energy is formed by absorbing renewable energy sources such as water, wind, and light. In addition, it is also necessary to analyze the generation of green secondary energy using the valley power of urban power grids. In areas where hydropower, wind energy development, and renewable energy are introduced, green electricity accounts for a certain proportion in urban power grids. Hydrogen energy can be a secondary energy source or an energy storage technology. Hydrogen energy and hydrogen energy, while constantly evolving, rely on traditional fossil resources to produce hydrogen, forming a clean and environmentally friendly new approach to hydrogen production. For Zhangjiagang City, it has made significant progress by leveraging its basic resource advantages and vigorously developing the photovoltaic industry.

2.2.3. Tax support policies

Local governments do not have legislative power over taxation. In China's political system, only the central government has the power to adjust tax policies. Therefore, in the development of Zhangjiagang's hydrogen energy industry, tax policies are mostly established based on national policies. The tax incentives for Zhangjiagang's hydrogen energy industry are relatively small and not flexible enough, which is also the reason why Zhangjiagang's hydrogen energy industry receives less support in taxation.

2.2.4. Financial Fund Incentive Policy

Financial incentive policies can effectively stimulate the development of enterprises, but cannot become the only way for enterprises to solve financial difficulties. The government

should implement special funds to help enterprises obtain funding needs to meet their operations and research and development. Among the hydrogen energy industry construction investment in Zhangjiagang City, 25% (13.76 million yuan) of fixed assets investment is capital fund, and the rest is financed by loans from financial institutions (41.28 million yuan). The annual interest rate of long-term loans is temporarily considered as 4.9%, and the principal and interest of loans will be repaid in 15 years. The working capital is calculated based on the operating cost of the first year, and 100% is the capital, which is 5 million yuan.

Firstly, the hydrogen energy project fund. The hydrogen energy industry has become a key focus of national structural reform, and provincial departments need to assist in applying for special funds every year. In 2011, the Provincial Department of Finance, in conjunction with the Provincial Department of Housing and Urban Rural Development, carefully organized the application of renewable energy building application demonstration projects. Currently, a total of 420 million yuan has been obtained from the central government for four types of industrial projects, effectively promoting the development of renewable energy building application in Zhangjiagang City. Secondly, hydrogen energy investment funds. The hydrogen energy industry, as an environmentally friendly energy source, can effectively improve corporate carbon emissions, and as a new energy source, its investment advantage is enormous. At present, the investment in Zhangjiagang City has reached 5 billion yuan.

2.2.5. Financial service platform support policies

In order to develop the hydrogen energy industry in Zhangjiagang City, it is necessary to first address the financing costs of enterprises. With the help of fiscal policies, local enterprises are encouraged to go public for financing, and strategic financing is used to meet the fundamental needs of enterprise development and improve the corporate governance structure. What the government needs to do is to help hydrogen energy enterprises create a good financing environment during the financing process and provide certain systems to help them go public. Secondly, it is also necessary for Zhangjiagang City to provide financial policies in the development of the hydrogen energy industry, such as commercial loans, giving green lights and preferential treatment, which can help enterprises obtain the necessary funds for their development. The government guides enterprises to obtain credit, provides guarantees for outstanding enterprises, and helps them grow. The development of enterprises nowadays cannot rely solely on the government. It is necessary to actively adopt appropriate and comprehensive financial methods in order to quickly achieve capital operation and apply funds to their own production.

3. Summary

Through searching and introducing the relevant policies of

the hydrogen energy industry in Zhangjiagang City, it can be seen that the development and growth of the hydrogen energy industry in Zhangjiagang City not only have basic industrial conditions, but also relatively complete and policy support. Moreover, Zhangjiagang City is actively building and developing its own hydrogen energy town. Coupled with the enormous pressure of environmental control, hydrogen energy development has a broader space. Finally, the attention and policy support given by the central government and the Zhangjiagang Municipal Government to the development of hydrogen energy cannot be overstated. It can be said that Zhangjiagang City has a unique advantage in developing the hydrogen energy industry.

Acknowledgment

This work was supported by Jiangsu Province University Philosophy and Social Science Foundation (2023SJYB1598) and Teaching Reform Project of Suzhou Industrial Vocational and Technical College (SGYJG2023B06)

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