

A Study on the Experience of Hydrogen Energy Research and Development in Suzhou City

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ABSTRACT

Through the exploration of advanced models of the hydrogen energy industry both domestically and internationally, it has been found that many developed countries abroad attach great importance to the hydrogen energy industry and provide policies that greatly help the development of the hydrogen energy industry. Whether it is funding, talent, or related supporting laws, they are relatively complete to help enterprises develop hydrogen energy. Beijing, Zhangjiakou, Foshan, and Yunfu cities in China have advanced experience in the construction of hydrogen energy industrial parks. Their park construction not only conforms to local characteristics, but also brings different changes to their surrounding areas, providing favorable assistance for the development and expansion of hydrogen energy.

KEYWORDS

Hydrogen Energy; Policies; Suzhou; Development

1. INTRODUCTION

The innovation mechanism of the hydrogen energy industry in Suzhou must be mainly based on local hydrogen energy enterprises [1]. Suzhou needs to guide the development of the hydrogen energy industry through relevant policies and jointly design local hydrogen energy development strategies with enterprises in order to promote innovative development of the hydrogen energy industry. Firstly, establish a hydrogen energy industry development base in Suzhou, with the hydrogen energy industrial park as the core and local key high-end enterprises as the foundation, to improve the hydrogen energy industry chain [2]. Establish and improve hydrogen energy research and development bases, equipment manufacturing and new battery enterprises in the hydrogen energy industry. Utilize the advantages of high-tech enterprises in research and development, technology, and talent to develop and innovate downstream applications of hydrogen energy, conquer key technologies such as battery capacity, lifespan, storage, and recycling, and pave the way for hydrogen energy development. Suzhou also needs to establish research institutions for hydrogen energy utilization with various universities [3]. At the beginning of establishment, certain preferential policies can be given to promote the progress of hydrogen energy development in Suzhou, providing an excellent policy platform for hydrogen energy in Suzhou [4].

Based on this platform, relevant enterprises in the hydrogen energy industry can more effectively introduce high-end talents and technologies, providing talent and technical support for the development of the hydrogen energy industry in Suzhou [5]. Finally, utilizing existing research and development institutions to apply excellent domestic and foreign hydrogen energy patents, technologies, and research and development achievements to local hydrogen energy industry enterprises, quickly achieving the effect of technology theory to practical application. Suzhou also needs to actively utilize China's "14th Five Year Plan" energy plan to clarify the direction of the

development of the hydrogen energy industry, which is to break through the key technologies of utilizing photovoltaic power generation technology and hydrogen energy vehicles, as well as hydrogen energy storage technology [6]. In order to meet the needs of researching and developing cleaner and more efficient vehicles, batteries, and other equipment for transformation and development, Suzhou should quickly develop into the hydrogen energy industry equipment and establish a competitive advantage and position in hydrogen energy equipment nationwide, Further achieving the leading influence of the development of Suzhou's hydrogen energy industry [7].

2. IMPROVING FINANCIAL POLICIES FOR THE HYDROGEN ENERGY INDUSTRY

At present, the main difficulty in the development of the hydrogen energy industry in Suzhou is the lack of funds. Due to the formation period of the hydrogen energy industry in Suzhou, financing is relatively difficult. Therefore, the Suzhou municipal government should assist enterprises in financing, provide certain tax incentives, or provide guarantees for enterprise loans to help them develop in the hydrogen energy industry. Establish a special fund for the hydrogen energy industry to provide precise assistance in various fields of hydrogen energy such as key technology research and development, equipment manufacturing, etc. The efficient utilization of the new hydrogen energy industry in Suzhou still relies on the market and financial models to completely solve the financing difficulties for enterprises. Secondly, it is necessary to develop new investment models, shift from the manufacturing strategy model of the hydrogen energy industry to the hydrogen finance model, actively establish cooperative relationships with various investment enterprises, promote the financing scale, models, and corresponding rewards of the hydrogen energy industry, and help enterprises have sufficient funds for development. Lack of policy guidance in the spatial layout of industrial development and the construction of industrial clusters

Conditions. At present, due to the positioning of Suzhou Hydrogen Energy Industrial Park as the overall development goal of the industry, it has not been combined with the development characteristics of Suzhou's hydrogen energy industry. This has led to blind planning in spatial layout without forming a coherent and energy-saving layout form [8]. The hydrogen energy industry in Suzhou has adopted a trend of current manufacturing and lagging operation, which is not conducive to the balance of market structure and also leads to a single development model. Secondly, although the combination of industry, academia, and research can bring talent advantages to the hydrogen energy industry, it cannot solve the problem of operational lag in the short term. In addition, the homogeneous competition among multiple enterprises in the hydrogen energy industrial park has led to a lack of vitality in the development of the hydrogen energy industry in Suzhou.

3. ACTIVELY CULTIVATING THE HYDROGEN ENERGY INDUSTRY MARKET

From the construction of hydrogen energy towns and demonstration areas in hydrogen energy industrial parks, it can be seen that Suzhou has been continuously promoting the development of the hydrogen energy industry chain [9]. Not only is Suzhou developing itself, but the local government is also actively promoting the upstream and downstream development and cooperation of the hydrogen energy industry with surrounding cities. Through the application of photovoltaic power generation for hydrogen production and storage, the surrounding cities of Suzhou are also actively participating in the development of the hydrogen energy industry. Due to the advantages of high efficiency and cleanliness of hydrogen energy, Suzhou has implemented many specific assistance policies and financial support in the national hydrogen energy subsidies. For example, by subsidizing electricity bills, preferential taxation, and helping the hydrogen energy industry park transform its own equipment and provide venues, Suzhou has continuously provided assistance to the hydrogen

energy industry. With strong support from Suzhou, The upstream and downstream industries of hydrogen energy in Suzhou have achieved great development, and many problems such as uncoordinated market development and incomplete industrial chain have been improved to some extent. Build new mobile hydrogen storage stations and new energy storage batteries, and promote them to local and surrounding buses in Suzhou. Currently, hydrogen energy buses in Suzhou account for more than 50% of the city's total. In order to help bus companies apply this cleaner energy bus, Suzhou has also provided certain financial and policy support, as well as assistance with surrounding bus companies, to promote the development of downstream applications of hydrogen energy. Moreover, in order to make the application of hydrogen energy more convenient, the construction of hydrogen refueling stations has also been included in the urban planning of Suzhou. This not only makes the hydrogen energy industry chain more complete, but also pushes the energy application of Suzhou to a new level.

In the hydrogen energy power generation system, we actively cooperate with the State Grid of China, establish an unmanned hydrogen energy substation system, promote the role of Suzhou's hydrogen energy industry in grid power supply, and closely cooperate with relevant enterprises. Now, the application of power generation in Suzhou's hydrogen energy industry chain has become the main supplier in the local distribution system. Moreover, in combination with downstream home furnishing enterprises, the hydrogen energy industry has been applied to the field of home life, and an intelligent hydrogen energy home furnishing teacher training project has been carried out.

4. OPTIMIZING THE STRUCTURE OF THE HYDROGEN ENERGY INDUSTRY

Suzhou City has also introduced enterprises focusing on photovoltaic, new energy batteries, and hydrogen energy vehicles into the industrial park for development through precise investment promotion, improving the hydrogen energy industry chain. Through precise investment promotion, we have successfully attracted leading enterprises in domestic new energy parks and laboratories for new energy research and development, playing a crucial role in improving the industrial layout of Suzhou City. These enterprises not only have advanced concepts and technologies, but also a well-established market. For example, in the photovoltaic field, the introduced enterprises are not only leaders in domestic photovoltaic power generation, but also major suppliers in the domestic market; Battery technology is a weakness in the development of Suzhou, and the introduction of enterprises has brought new battery manufacturing ideas, thereby reducing the cost of battery manufacturing in Suzhou and driving the development of a large number of hydrogen energy industries. Currently, the development of hydrogen energy in Suzhou has become a model of industrial cluster development. In terms of downstream applications, the production of hydrogen energy vehicles has also increased the scale of upstream hydrogen production and storage enterprises, The current development of hydrogen energy in Suzhou has formed a new approach of coordinated upstream and downstream development and overall planning. The precise investment promotion in Suzhou is still ongoing. Through continuously deepening policy assistance and financial incentive policies, many excellent enterprises are moving towards the hydrogen energy industry in Suzhou. For outstanding enterprises that can successfully enter Suzhou, Suzhou will also receive one-time financial incentives. The Suzhou Municipal Government hopes to further improve the development of the hydrogen energy industry through investment promotion.

5. DEVELOP EXTERNALITY POLICIES FOR THE HYDROGEN ENERGY INDUSTRY

The development of hydrogen energy mainly relies on innovation. Innovation is mainly solved by people. In order to scientifically develop the hydrogen energy industry, Suzhou helps local enterprises

actively implement talent introduction and training. In addition to introducing excellent talents from the domestic hydrogen energy industry, we also actively cooperate with foreign excellent enterprises to attract these outstanding talents in hydrogen energy technology, management, and other aspects to Suzhou. Suzhou also provides many preferential policies for the introduction of hydrogen energy talents, such as providing entrepreneurial funds, issuing government subsidies, and arranging for self-study students to study and find employment. The purpose is to retain these outstanding talents and push the development of Suzhou's hydrogen energy industry to higher fields and broader space. Actively introduce training methods for outstanding technical personnel from abroad, support local enterprises in Suzhou to carry out extensive cooperation with them, and also enable their own enterprises to

Technical personnel from the industry will go to advanced countries such as Japan and Germany for training and learning in hydrogen energy development, identify their own gaps, master their advanced production technology, improve Suzhou's technical equipment, application and theoretical application in the field of hydrogen energy, and thus make Suzhou's hydrogen energy development more efficient. In terms of land use for the hydrogen energy industry, the Suzhou Municipal Government has allocated a special land use policy for the development of hydrogen energy, which not only provides site guarantee, but also provides certain preferential policies to help enterprises reduce expenses in the early stages of entrepreneurship and use funds for technical guarantee. During the construction of hydrogen energy projects, if they can reach a certain scale, Suzhou City will also provide a one-time reward to help enterprises put into operation as soon as possible. Finally, Suzhou also established an internet exchange platform for hydrogen energy development, integrating its own industrial park enterprises to actively participate. At the same time, it also collaborates with various universities, research and development bases, and key foreign enterprises to help local enterprises in Suzhou apply high-end resources of the hydrogen energy industry in their own fields, laying a solid foundation for hydrogen energy innovation in Suzhou.

6. SUMMARY

The author's research this time is based on advanced experience in the hydrogen energy industry at home and abroad as a reference, guided by mature industrial policies, and explores the development of the hydrogen energy industry in Suzhou from a public perspective. By analyzing the current development status of the hydrogen energy industry in Suzhou, Jiangsu Province, it is found that Suzhou has encountered problems and difficulties in actual development. Policy optimization is carried out from a public perspective, and relevant suggestions for the rapid development of the hydrogen energy industry are proposed. Firstly, the development of the hydrogen energy industry is an aspect of solving global energy problems, which has attracted attention from various countries. Our country's development requirements for the energy industry are based on the premise of sustainable energy development, energy security, and environmental protection. The hydrogen energy industry is such a clean and efficient energy source, which is very in line with the requirements of China's energy development. From the perspective of Jiangsu Province, the development of the hydrogen energy industry is also in line with the local situation. Secondly, the hydrogen energy industry in Suzhou has achieved significant development during China's 13th Five Year Plan period. Nowadays, the hydrogen energy industry in Suzhou is centered around solar photovoltaic, energy storage batteries, and hydrogen powered vehicles. However, due to the short development history of the hydrogen energy industry, many hydrogen related enterprises in Suzhou are currently too small in scale, with incomplete industrial structures, and a relatively lack of innovation, funding, and talent in the energy field.

The fundamental reason is that the public service system in Suzhou is currently incomplete, with limited national and local policy support, as well as corresponding financing and organization that are not conducive to the rapid growth of the hydrogen energy industry. Thirdly, in response to the

current problems and difficulties in the development of the hydrogen energy industry in Suzhou, it is necessary to optimize the structure of the hydrogen energy industry in Suzhou, establish a focus on the three major industrial versions of solar photovoltaic, battery, and hydrogen energy vehicles based on the existing foundation, introduce outstanding domestic and foreign enterprises in the hydrogen energy industry, establish research studios for the development of the hydrogen energy industry with key enterprises and universities, and promote the gradual improvement of the hydrogen energy industry chain, Promote fundamental development. Fourthly, Suzhou should also optimize key links in the development of the hydrogen energy industry, especially hydrogen production and storage. Increase policy investment in transportation and related aspects to help relevant industries support the development of local hydrogen energy industry; and actively developing the utilization and commercialization of hydrogen energy. Fifthly, Suzhou should actively introduce and cultivate high-end talents in the hydrogen energy industry. The development of the industry cannot be separated from innovation, and innovation cannot be separated from talent. For excellent hydrogen energy talents at home and abroad, various relevant preferential benefits should be given to help them solve their living problems. Only by attracting outstanding personnel from the hydrogen energy industry chain to Suzhou can the development of the local hydrogen energy industry be effectively promoted.

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