WEP Warwick Evans Publishing

International Journal of Global Economics and Management

ISSN: 3005-9690 (Print), ISSN: 3005-8090 (Online) | Volume 4, Number 1, Year 2024
DOI: https://doi.org/10.62051/ijgem.v4n1.58
Journal homepage: https://wepub.org/index.php/IJGEM/index

Study on the Synergistic Development of New Energy Industry in Chengdu-Chongqing Economic Zone

Junfeng Dong, Long Tang *, Min Pang, Wei Li

School of Economics and Management, Southwest Petroleum University, Chengdu, 610500, China
*Corresponding Author: Long Tang

ABSTRACT

With the growing global demand for clean energy, Chengdu-Chongqing economic zone is facing major opportunities and challenges in developing a new energy industry. This paper reveals the overall pattern of new energy industry development in Chengdu-Chongqing economic zone by comprehensively analyzing the development status of photovoltaic, wind power, and hydrogen energy industries in the area. Secondly, for the synergistic development dilemma existing in technology, market, and talents, it puts forward relevant problems and discusses the solution path in depth. On this basis, this paper proposes a path for the synergistic development of a new energy industry in Chengdu-Chongqing economic zone. This study provides theoretical guidance and policy recommendations for the synergistic development of a new energy industry in Chengdu-Chongqing economic zone. It helps to promote the transformation and upgrading of the region's economic structure and sustainable development.

KEYWORDS

Chengdu-Chongqing economic zone; New energy; Industry synergistic development

1. INTRODUCTION

Energy is the backbone of economic development and social progress and is vital to national security and people's well-being. With industrialization and urbanization, people are turning to new energy sources to meet climate and environmental challenges. China has set out its carbon peaking and carbon neutrality targets since 2020, which has driven the rapid development of the new energy industry and brought good benefits to the economy, society, and the environment.

In recent years, China's economy has been growing at a high rate, but the problem of imbalanced development between the East and West is prominent. The 19th CPC National Congress proposes to develop Chengdu-Chongqing economic zone, emphasizing energy security and power supply optimization, pointing out the direction for high-quality development. Relying on rich resources, Chengdu-Chongqing economic zone has been actively developing a new energy industry, creating a 100-billion-dollar industrial cluster, and promoting the development of hydrogen energy and fuel cell industry. However, as the scale of the new energy industry expands, it faces challenges such as planning, energy consumption, technological innovation, and equipment recycling, which constrain its high-quality development. In this context, it is crucial to study the path and mechanism of collaborative development of the new energy industry in Chengdu-Chongqing economic zone. Through scientific planning and reasonable mechanisms, we can give full play to regional advantages and realize a win-win situation in terms of economy and ecology.

2. THE CURRENT SITUATION OF NEW ENERGY INDUSTRY DEVELOPMENT IN CHENGDU-CHONGQING ECONOMIC ZONE

In Chengdu-Chongqing economic zone, the development of new energy has become an important engine for promoting economic growth. The continuous development of photovoltaic (PV), wind power, and hydrogen energy has injected new vitality into the regional economy. The photovoltaic industry is booming in the western part of Sichuan Province, especially in the western Sichuan Plateau, where the scale of installed photovoltaic capacity has been expanding, giving impetus to the transformation of the local energy structure. Meanwhile, the full utilization of wind power resources has also become an important part of the energy transition in Chengdu-Chongqing economic zone. The hydrogen energy industry in Sichuan Province and Chongqing Municipality has also shown vigorous development, utilizing abundant hydropower resources to provide favorable conditions for the development of clean energy. The rise of these new energy industries has not only injected new momentum into the regional economy but also provided important support for the construction of the Twin Cities Economic Circle. In the new development era, Chengdu-Chongqing economic zone will continue to actively explore the development path of new energy to help sustain healthy economic development.

2.1. Photovoltaic Industry

Solar energy resources in Sichuan Province are unevenly distributed, with scarcity in the east and abundance in the west, particularly on the western Sichuan plateau. The photovoltaic industry in the western region is rapidly growing, and as of June 2022, the province has accumulated 2GW of installed PV capacity. Additionally, the world's first terraced water-photovoltaic storage and complementary power plant has been commissioned in Aba Prefecture. In Chongqing Municipality, solar energy resources are characterized by an annual sunshine of 1000 to 1400 hours, with a sunshine percentage of only 25% to 35%. The installed capacity of PV power generation is relatively low, but it added 213,000 kilowatts in the first half of 2023, showing a significant growth in industrial and commercial sectors. By the end of 2022, Sichuan Province had an installed capacity of 2.062 million kilowatts of PV, ranking fifth in the region, while Chongqing Municipality had a cumulative installed capacity of 693,000 kilowatts, ranking last.

2.2. Wind Power Industry

The wind energy resources in Sichuan Province are mainly distributed in southwest Sichuan, such as Ganzi Prefecture, Aba Prefecture and around Panzhihua City. By the end of 2022, the total installed power capacity of Sichuan Province will reach 123.9 million kilowatts, the installed hydropower capacity will reach 97.485 million kilowatts, and the enterprise wind power generation capacity will reach 10.62 billion kilowatt-hours. During the "14th Five-Year Plan" period, it is expected that about 6 million kilowatts of wind power will be installed, and the total installed capacity will exceed 10 million kilowatts.

Wind power resources in Chongqing Municipality are mainly located in the northeastern and southeastern alpine areas, especially in alpine meadows and ridges. From 2017 to 2022, wind power generation increased from 767 million kWh to 2.81 billion kWh. in november 2022, wind power generation from industrial enterprises above designated size increased by 141.4% year-on-year to 280 million kWh. the city's wind power generation is expected to increase by 1.4% year-on-year to 1.4 billion kWh by the end of this year.

2.3. Hydrogen Energy Industry

Sichuan Province is a resource-rich region with abundant reserves of mineral resources such as hydroelectric power, wind power, natural gas, shale gas, vanadium, titanium and lithium. Meanwhile,

the chemical industry and industrial by-production of hydrogen are also developing healthily, laying a good foundation for the development of the hydrogen energy industry. There are more than 100 enterprises and research institutes in the hydrogen energy industry in Sichuan Province, covering various fields from hydrogen production, storage and transportation, refueling, testing to fuel cell and vehicle R&D and manufacturing.

As an important fulcrum of China's western development, Chongqing plays an important role in the country's regional development and opening up to the outside world. The city has developed chemical and electronic industries, has a large amount of industrial by-product hydrogen resources to be utilized, and has a strong automobile industry, which provides a good foundation for the development of hydrogen energy industry. In recent years, Chongqing Municipality has basically made up for the weak links in the industrial chain by introducing and cultivating hydrogen energy industry chain enterprises, and formed two major hydrogen energy industry development highlands.

Chengdu-Chongqing region is well endowed with nature, especially for the clean hydrogen production required for hydropower, wind and other natural resources, Chongqing has a better industrial base for hydrogen production and abundant hydrogen resources, and the cost is low, but because of the vast mountainous area, the transportation of hydrogen is difficult and costly; Chengdu's neighboring cities are rich in industrial byproducts of hydrogen, water electrolysis of hydrogen to produce a superior energy base, and the storage and transportation costs of hydrogen are relatively low, the hydrogen source short distance supply is sufficient. The short-distance supply of hydrogen is sufficient.

3. DILEMMA OF SYNERGISTIC DEVELOPMENT OF NEW ENERGY INDUSTRY IN CHENGDU-CHONGQING ECONOMIC ZONE

3.1. Technical Aspects

The R&D of new energy technologies in the Chengdu-Chongqing economic zone is deficient compared with the leading level at home and abroad, especially in high-efficiency energy conversion and energy storage technologies. Although there are some achievements, there are still deficiencies in basic research and engineering applications. The development of energy storage technology is crucial, but the current research level is low and has not reached market-oriented application. Chengdu-Chongqing new energy industry technology innovation is insufficient, the conversion efficiency is low, and lack of strength to compete with other regions, resulting in the market of new products and technologies are mostly launched by other parties, and it is difficult for Chengdu-Chongqing enterprises to take advantage of the situation.

Chengdu-Chongqing economic zone has not invested enough in innovation. Although the government has increased its support for the new energy industry, the actual investment is insufficient, and companies have not invested enough in technological research and development. This leads to long R&D cycles and high risk of market failure. Government regulatory policies are not clear enough to provide clearer planning and rules for research and business. Scientific research institutions favor basic research and academic research, and are unable to understand the market needs and business opportunities of enterprises. Some enterprises also focus on actual production and operation, and lack proper technology investment and innovative spirit. Innovation in the new energy industry needs to keep up with market demand and trends, and Chengdu-Chongqing economic zone lacks the innovation ability to adapt to market demand. Enterprises and research institutions fail to understand market demand and trends in depth, and are unable to accurately grasp the actual demand for new products and technologies, resulting in a disconnect between the research and application of new technologies and market demand.

3.2. Market Level

In the electricity market, traditional energy sources (e.g. coal and oil) still dominate. This is because the supply chain for traditional energy sources has matured into a complete system of energy production, transmission and consumption. Changing this situation requires time and capital investment. In addition, the consumption of new energy power faces difficulties, as its instability and intermittency pose challenges to grid scheduling and operations, limiting the development of the new energy industry. Consumer acceptance is relatively low in the new energy vehicle market. Despite government measures to encourage new energy vehicles, such as tax breaks, subsidies and infrastructure investment, problems remain. Inadequate charging facilities are an important factor restricting consumer purchases, especially in Chengdu-Chongqing economic zone, where the number and distribution of new energy charging piles are unsatisfactory. In addition, the relatively short range of new energy vehicles has caused some consumers to worry about long-distance travel. The generally high selling price also limits the willingness to buy.

In the Chengdu-Chongqing area, new energy production capacity is limited and the scale is relatively small, resulting in higher production costs and making the price of new energy products unable to compete with traditional energy sources. Especially in the field of photovoltaic power generation, batteries and other areas, the higher cost, so that the new energy product prices are higher, limiting the scale of industrial development and market penetration. The new energy industry needs a lot of investment and technical support, the current limited production capacity in Chengdu-Chongqing area can not meet the market demand, resulting in insufficient supply and rising prices. High production costs further aggravate the price pressure. New energy technology is relatively new, requiring a lot of R & D and technological innovation, however, the Chengdu-Chongqing area has limited resources, making the production cost relatively high. Fierce market competition and serious product homogenization have depressed market prices. Despite attracting the participation of many enterprises, limited production capacity and similar technologies lead to product homogenization, and consumers tend to choose lower-priced products.

3.3. Talent Level

Due to the huge difference between the new energy industry and the traditional energy industry, the technology and knowledge required for the new energy industry is also very different from that of the traditional energy industry. However, higher education institutions and research institutes in Chengdu-Chongqing area still focus on traditional energy in teaching and research, and the corresponding disciplines and personnel training programs do not fully take into account the needs of the new energy industry. This has led to the inadequacy of the quantity and quality of new energy talents in the region, which cannot meet the needs of the rapid development of the new energy industry.

Chengdu-Chongqing region has relatively few research institutions and enterprises in the field of new energy industry, and there is a lack of new energy-related innovation platforms and practice bases. This also leads to a lack of practical opportunities for new energy talents to apply their knowledge in actual projects, and a lack of opportunities for practical exercises and technological innovation. This creates constraints on the cultivation and enhancement of new energy talents, and also limits the innovation and development of new energy industry.

Due to the rapid development and demand of the new energy industry and fierce competition, many excellent new energy talents will choose to go to regions with more mature and developed development. The policies and measures of local governments, universities and enterprises in the introduction and retention of talents are relatively lagging behind, and do not provide sufficient attractive and welfare conditions, making the new energy talent loss serious. This has also caused the low mobility of talents in the new energy industry and the barren phenomenon of new energy talents, which further aggravates the problem of talent shortage.

4. THE PATH OF SYNERGISTIC DEVELOPMENT OF NEW ENERGY INDUSTRY IN CHENGDU-CHONGQING ECONOMIC ZONE

4.1. Focus on Clustering and Optimize the Reasonable Distribution of Core Enterprises

In Chengdu-Chongqing economic zone, the synergistic development path choice of new energy industry focuses on clustering, and optimizing the reasonable distribution of core enterprises is a crucial strategic initiative. This path choice is aimed at strengthening the scientific and technological economic ties between cities, realizing industrial integration and functional complementary cooperation, especially to strengthen the radiation effect of the two core cities of Chongqing and Chengdu, and make full use of the innovative development of Mianyang, Deyang and other central cities in order to promote the coordinated development of the Chengdu-Chongqing economic zone and the effective circulation and aggregation of all kinds of factors of production, and to promote the new energy industry in the Chengdu-Chongqing economic zone to form the core competitiveness of the Cluster effect.

First of all, building a new energy industrial park is one of the important initiatives. The government should clarify planning and policy support, and build targeted parks for Chengdu and Chongqing to attract leading and supporting enterprises to move in and form a tight industrial cluster effect. This requires the government to cooperate with enterprises to create a production and R&D environment and provide preferential policies, such as tax breaks and land use support.

Secondly, the Government can optimize the distribution of enterprises through guidance policies. Incentives such as tax concessions and land use policies can attract core enterprises to set up production bases in specific regions, promote the synergistic development of the industrial chain, and form a reasonable pattern of industrial distribution. When formulating policies, the government needs to take into account various factors to ensure their scientific nature and relevance, and establish a monitoring and evaluation mechanism.

Thirdly, building demonstration zones for the new energy industry is a key part. The Government should select suitable areas and focus on factors such as transportation, talent and land use to create demonstration zones, including manufacturing, scientific research and talent training. The Government can formulate policies to support the development of demonstration zones, such as tax incentives and land use support, and establish a management organization to oversee the construction and operation of demonstration zones.

Fourth, it is vital to encourage cooperation and sharing among enterprises. The Government can promote strategic cooperation among enterprises through policy guidance, such as joint research and development of new technologies, resource sharing and cost reduction, to promote a closer industrial chain and enhance competitiveness. In addition, the government can establish a technology-sharing platform to promote cooperation and promote technological innovation and synergistic development upstream and downstream of the industry chain.

Finally, the integration and optimization of the industrial chain is a key player in the clustering strategy. The government can optimize the industry chain by strengthening the research and development and production of new energy materials, building an intelligent manufacturing platform to improve production efficiency and quality, and building a sales and service network to optimize the downstream of the industry chain. The government can also formulate green manufacturing standards to guide more in-depth cooperation and promote the greening of the industry chain.

4.2. Using Platformization As A Link to Break Down Regional Barriers to Industrial Development

On the road of synergistic development of new energy industry in the twin-city economic circle of Chengdu-Chongqing economic zone, platformization as a link to open up regional barriers to industrial development will become a key initiative to promote industrial prosperity. By building a multi-dimensional platform, it can realize the close connection between the upstream and downstream of the new energy industry chain, prompting the free flow of resources, technology and talents between the twin cities in Chengdu-Chongqing economic zone, thus promoting the efficient and synergistic development of the entire new energy industry. The following is an in-depth discussion of the four key platforms chosen for this path to realize the synergistic development of the new energy industry.

The establishment of a shared new energy industry expo platform, combined with the combination of "cloud exhibition" and "on-site exhibition", will promote online display, communication and cooperation among enterprises, break through the limitations of time and space, and increase the global visibility and market share of the new energy industry. Firstly, the construction of the exhibition platform will break the limitation of time and space and realize real-time interaction among enterprises. Secondly, the construction and sharing of the exhibition platform will become a platform for in-depth cooperation between the upstream and downstream enterprises of the new energy industry chain in Chengdu-Chongqing economic zone. In addition, the exhibition platform is also a powerful tool to promote the global visibility and market share of new energy industry in Chengdu-Chongqing economic zone.

The construction of a new free trade zone, featuring technology trading, strengthens the institutional docking with the China (Sichuan) Pilot Free Trade Zone and improves the competitiveness of the new energy industry in the international market. First, the construction of a new free trade zone is an effective way to break down regional barriers to industrial development. Second, the foreign trade platform featuring technology trading will become a distribution center for new energy industry technologies and innovations. Third, the foreign trade platform can also accelerate the promotion of new energy industry in Chengdu-Chongqing economic zone in the international market.

Build a service platform for sharing scientific and technological resources, integrate scientific research instruments, scientific and technological platforms, scientific research achievements, scientific and technological talents and other resources, promote the interoperability and mutual recognition of scientific and technological resources, and improve the efficiency of resource utilization. Firstly, the science and technology resources service platform will provide a convenient cooperation channel for new energy industry in the field of science and technology innovation. Secondly, through the unified data standard and common sharing and co-management mechanism, the science and technology resources service platform will realize the mutual recognition of science and technology resources. In addition, the S&T resource service platform will also improve the utilization efficiency of S&T resources.

Jointly strive to create national-level innovation platforms, including national-level scientific and technological infrastructures and research institutes, to introduce more national-level scientific research resources and support, and to promote technological innovation and upgrading of the new energy industry. The construction of national-level innovation platforms will enhance the status of the new energy industry in Chengdu-Chongqing economic zone in the national science and technology system. The introduction of national-level innovation platform will bring richer scientific research resources and technical support. In addition, the construction of the national innovation platform is also expected to become a bridge for the new energy industry in Chengdu-Chongqing region to go to the international market.

4.3. Promote the Upgrading of the Industrial Service System With Innovativeness at Its Core

The collaborative development of the new energy industry in Chengdu-Chongqing economic zone is centered on innovation, and is committed to promoting the comprehensive upgrading of the industrial service system. This path choice will become a power source to lead the future of the industry and inject new vitality into the regional economy. In the following, we will discuss three key aspects of this path choice to realize the synergistic development of new energy industry.

First of all, Chengdu-Chongqing economic zone needs specific and targeted top-level design of energy science and technology innovation, refinement of energy resources science and technology innovation planning and energy, resources science and technology development strategic planning for 2035. Secondly, deepening the reform of energy science and technology system is indispensable to realize the energy technology innovation system guided by the government, led by the market, led by enterprises and participated by the society, and to promote the upgrading of the industrial service system. In addition, through cooperation with national innovation platforms, Chengdu-Chongqing economic zone can obtain richer scientific research resources and technical support to promote technological innovation and upgrading of new energy industry.

In order to promote innovation, Chengdu-Chongqing economic zone can build a diversified and multi-level energy science and technology innovation platform. Diversified participants will be the key to success, and all types of subjects should play to their respective strengths. Research on key technologies is the core task, and Chengdu-Chongqing economic zone can focus on coal clean and intelligent mining, efficient utilization of renewable energy, energy storage and distributed energy. In addition, the construction of these innovation platforms can also make full use of policy support to actively attract innovation resources from all walks of life, forming a broader innovation cooperation network.

Chengdu-Chongqing economic zone can promote the leapfrog development of key technologies in the energy sector and the upgrading of the overall industrial service system through the implementation of major scientific and technological projects and programs. The focus can be placed on the development of unconventional resources, nuclear power independent innovation, new energy vehicles and smart grids and other areas of synergistic research and project implementation. In order to better implement this pathway option, Chengdu-Chongqing economic zone should establish an organizational system for collaborative science and technology innovation, promote in-depth cooperation among all parties, and focus on the cultivation and introduction of talents to improve the level of scientific research.

ACKNOWLEDGEMENTS

Foundation Item: 2024 College Students' Innovation and Entrepreneurship Training Program Project in Sichuan Province "Exploration of new energy industry synergistic development path in Chengdu-Chongqing economic zone". (S202410615204);

Chengdu Soft Science Project: "Research on the innovation mechanism and risk prevention of the new energy industry in Chengdu under carbon peaking and carbon neutrality goals" (2023-RK00-00174-ZF)

REFERENCES

[1] Yi Miao. Exploring the construction of Chengdu-Chongqing economic zone in the new era: Historical review and realistic judgment [J]. Western Forum, 2021, 31(3):72-81.

[2] LONG Yunan, KONG Deyuan, CHEN Man. Research on the long-term mechanism of low-carbon financial science and technology to promote industrial upgrading--Taking the case of Chengdu-Chongqing economic zone [J]. Scientific Management Research, 2022, 40(3):8.

[3] HUANG Huan, FUANG Jiaxin, ZHANG Qiufeng, et al. Research on the collaborative innovation development capability of the twin-city economic circle in Chengdu-Chongqing economic zone [J]. Technological Economy, 2021, 40(6):8

[4] Zuo Youming. Research on Manufacturing Competitiveness of Twin-city Economic Circle in Chengdu-Chongqing economic zone [D]. Chengdu: Southwest University of Finance and Economics, 2021.