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Analysis of the Prospect of New Energy and Low-altitude Economy Industry Combination under the Background of Low-carbon Economy

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Abstract: *With the increasingly environmental problems, traditional fossil energy will be gradually eliminated, and new energy will occupy an important position. How to better develop the new energy industry is an important research interest. Low-altitude economy is a very popular topic in recent years, and the depth of the development of low-altitude economy will be further expanded in the future. This paper discusses one of the direction of the combination of new energy and low-altitude economy and provide some references for the integration of new energy and low-altitude economy.*

Keywords: *New Energy, Low-altitude Economy, Low-carbon Economy*

1. Introduction

As global concern of environmental protection continues to grow, people increasingly recognize that traditional energy sources will cause irreversible damage to the environment, which makes new energy become an important field to develop. And low-carbon economy has become the primary development guideline of the industrial and commercial society under this circumstance. The low-carbon economy not only helps to reduce greenhouse gas, lower the rate and magnitude of global temperature and mitigate the negative impacts of climate change, but also reduces the consumption of fossil fuels and the emission of pollutants. The low-carbon economy can mitigate the erosion and destruction of the natural environment and preserve ecosystems and biodiversity. The low-carbon economy can encourage and promote the improvement of the efficiency of energy utilization, reduce energy consumption through the adoption of more efficient energy technologies and equipment, and reduce energy waste and loss, thereby realizing the sustainable use of energy. In addition, the low-carbon economy will also bring new industries and business opportunities, such as emerging industries in the fields of clean energy, new materials, energy conservation and environmental protection, the development of which can lead to the upgrading and transformation of the industrial structure, and subsequently improve economic efficiency. Therefore, the new energy industry should take up the important responsibility to make its own contribution to the development of low-carbon economy.[1]

In 2016, the State Council issued the *Guiding Opinions on Promoting the Development of General Aviation*, which ushered in a major opportunity for the development of general aviation and drew the close attention of the whole society to the development of general aviation in China. In 2021, the State Council issued the *Outline of the National Comprehensive Three-dimensional Transportation Network Plan*, which put forward the development of the concept of low-altitude economy for the first time, and set up a pilot program in five provinces. In the state of the economic transformation and technological progress, low altitude airspace gradually becomes a new economic growth point with general aviation and its ecological chain of industries.[2] And the "low altitude economy" has become a new economic growth point. Under the background of "low altitude economy", general aviation traditional agriculture and forestry operations, industrial operations will continue to maintain rapid growth in the future, while tourism, short-haul passenger and cargo transportation, business flights, private flights, medical rescue, urban security patrols, power line inspection, etc. will become a new growth point.[3]

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2. Development

2.1. Development of the new energy industry

New energy is an important part of China's energy supply system, which is of great significance for improving the energy structure, protecting the ecological environment, coping with climate change, and realizing sustainable economic and social development. From 2017 to 2023, China's new energy power generation capacity has shown a year-on-year upward trend. By the end of December 2023, the total installed capacity of renewable energy power generation in China amounted to 1.516 billion kilowatts, accounting for 51.9% of the country's total power generation capacity, and accounting for nearly 40% of the total installed capacity of renewable energy power generation in the world. Among them, the total installed capacity of hydropower amounted to 422 million kilowatts, a year-on-year increase of 1.8%; the total installed capacity of wind power was 441 million kilowatts, a year-on- year increase of 20.7%; the total installed capacity of photovoltaic was 609 million kilowatts, a year-on-year increase of 55.2%. During the "14th Five-Year Plan" period, the installed capacity of new energy power generation will continue to grow. New energy as the main body of the new power system will accelerate the formation, at the same time, the new energy storage into the scale of development stage. Combined with the development trend of China's new energy power generation installed capacity is predicted to reach 3.8 billion kilowatts in 2029.

2.2. Development of low-altitude economy

Low altitude usually refers to the airspace within a vertical distance of 1,000 meters from the ground plane directly below. The so-called "low-altitude economy" refers to a comprehensive economic model that focuses on civil manned and unmanned aircraft, and is driven by multi-profile low-altitude flight activities, such as manned, cargo-carrying and other operational activities, and radiates and drives the integration and development of related fields. The low-altitude economy industry includes four modules: low-altitude manufacturing, low-altitude flight, low-altitude security and comprehensive services. General aviation is the main body of low-altitude economy, and its flight activities have the characteristics of mobility, flexibility, speed and efficiency, which can effectively fill the short board of transportation brought by poor ground transportation, provide support for public emergency response, and cultivate and promote the development of the industry chain. The industrial chain structure of low-altitude economy takes the R&D, production, manufacturing and flight operation of general aviation aircraft in low-altitude airspace as the basic core, radiating logistics, tourism, sports, medical care, exhibitions, passenger transportation, services, training, scientific research and other industries. Data show that by the end of 2023, there are about 2,000 UAV design and manufacturing units, 1,267,000 domestic registered UAVs, a year- on-year increase of 32.2%; 23.11 million flight hours, a year-on-year increase of 11.8%. In order to support the expansion and sustained development of the low-altitude economy industry, resources should be kept invested in the areas of management, technology, talents, infrastructure and ecology. According to the industry development report, it is predicted that by 2030, the total market size of general aviation in China will reach 2 trillion yuan, and the low-altitude economy will become a powerful support for the country and people.

3. Problems

3.1. Problems in the new energy industry

The development of new energy industry requires continuous technological innovation and improvement in order to enhance the efficiency and reliability of new energy sources and to promote the commercial application and industrialization of new energy sources. In the process of technological research, stable economic support is needed, which requires continuous investment and financing. At the same time, due to the difficulty of technological breakthroughs, time and human resources need to be invested. In terms of enterprise operation, the cost of new energy technology and equipment is usually high, and the demand is constrained by national policies, technical level and other aspects, which in turn leads to the development of new energy industry is difficult. In terms of new energy ratios, the configuration between energy sources will also face many limitations and challenges, mainly because the ability of new energy development depends on the way new energy sources and traditional energy sources are composed, and this requires a comprehensive improvement in energy mix and optimization. In terms of capital investment, investing in the new energy industry requires huge capital, but because of

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the long return on investment in this industry, financing will be relatively difficult, which also limits the expansion of the industry to a certain extent. In addition, China's new energy industry as a strategic emerging industry to cultivate, but there are still shortcomings such as insufficient technological innovation capacity and policy dependence. To promote the innovative development of new energy industry is to solve the current development problems, improve the ability of independent technological innovation, get rid of policy dependence, and realize the stable, benign and healthy development of the industry.[4] The promotion of innovative development of new energy industry is to break the current development problems, improve the independent innovation capacity of technology, get rid of policy dependence, and realize stable, benign and healthy development of the industry.

3.2. Problems in the low-altitude economy

There are also many difficulties in the low-altitude economy, which is a new industry. First of all, public awareness and acceptance of low-altitude economy is relatively low, the market vitality of low-altitude consumption has not been fully stimulated, and low-altitude consumption has not yet formed a large scale [5]. On the other hand, there is a serious lack of laws and regulations in China, and many drones fly without permission, which not only disrupts the normal aviation order, but also brings a serious threat to aviation safety. The development of low- altitude economy industry is also constrained by airspace resources, due to the influence of land, environment and other factors, the progress of airport construction is slow, unable to meet the growing market demand. At the same time, due to the strict management of airspace, the flight time and routes of general aviation aircraft are also subject to greater restrictions, which restricts the rapid development of the general aviation industry. In terms of technological innovation, although China has made some progress in the field of aircraft manufacturing, there is still a big gap compared with the advanced level abroad. This has led to a high degree of foreign dependence on key technologies and core equipment in China's low-altitude economic industry, making it difficult to form a competitive advantage.

4. Countermeasures and recommendations for the development of the new energy industry in conjunction with the low-altitude economy

As an important support for economic and social development, the new energy industry is becoming a powerful driving force to promote the development of low- altitude economy. And the rise of low-altitude economy, also provide a new market demand and growth space for the new energy industry. The mutual integration of different industries will be an important direction of development in the future. Low-altitude economy and new energy industry are both important emerging industries in the future, how to effectively combine the new energy industry and low-altitude economy to improve economic efficiency will become an important research field. The combination will not only provide a new direction for the low-altitude economy, but also bring new opportunities for the innovation and development of the new energy industry.

At present, the combination of low-altitude economy and new energy industry mainly focuses on electric power inspection, such as the use of drones for line inspection, fault troubleshooting, and data transmission and analysis. The drone has the advantages of maneuverability, speed, and wide range, which can quickly reach the inspection area and carry out high-precision and high-efficiency inspections of power equipment. Compared with the traditional manual inspection method, drone inspection can greatly improve the inspection efficiency, shorten the inspection cycle, timely detection and treatment of equipment failure, so as to protect the normal operation of the power system. In addition, drone inspection can improve the safety of power inspection. In the electric power inspection process, manual inspection often need to approach the high voltage equipment, there are electric shock, fall from height and other safety risks. The drone inspection can complete the inspection task without contacting the equipment, effectively avoiding the safety risks in manual inspection, and safeguarding the life safety of inspection personnel. Drone power inspection technology research also helps to promote the intelligent development of the power industry. Withthe continuous development of artificial intelligence, machine learning and other technologies, drone power inspection technology can realize more intelligent and automated inspection. Through the intelligent analysis of inspection data, it can realize the state monitoring of power equipment, fault prediction and other functions, further improving the operational efficiency and reliability of the power system. Therefore, the research of UAV inspection technology is of great significance to improve the efficiency and safety of electric power inspection and promote the intelligent development of the electric power industry. In the future, with the continuous development and application of UAV technology, UAV power inspection technology will play an increasingly important

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role in the power industry. [6] The research of UAV power inspection technology will play a more and more important role in the power industry.

Nowadays, human society is in the era of "human-machine-thing", which means everything could interconnect. [7] The Internet of Energy is a new type of power system built on the concept of the Internet. Energy Internet is a new type of information and energy integration "wide area network" built on the concept of the Internet, which takes the large power grid as the "backbone network" and microgrids as the "local area network" to realize the true realization of energy and energy integration architecture with open and peer-to-peer information and energy integration. It uses the large power grid as the "backbone network" and the microgrid as the "local area network", with an open and peer-to-peer information-energy integration architecture, truly realizing bidirectional on- demand transmission of energy and dynamic balanced use, and can adapt to new energy access to the maximum extent. As the most important link in the development of low-altitude economy, the UAV industry urgently needs to build an efficient low-altitude governance system, and low-altitude intelligent networking will emerge. Low-altitude Intelligent Networking refers to the intelligent digital network system constructed by integrating the use of networked, digital and intelligent technologies in low-altitude airspace, which is the most important infrastructure for promoting the development of low-altitude industrialization, and is an important configuration element for the development of low-altitude economy. [8] The Internet of Things and artificial intelligence can be used as the development direction for the combination of new energy and low-altitude economy in the future. Low-altitude intelligent network system architecture is to rely on the sky, earth and sea network infrastructure to realize the evolution of traditional interconnection network to the intelligent interconnection network of everything, and to form a cyberspace suitable for the digitalization of low- altitude business and intelligent operation.

The construction of the low-altitude intelligent network should focus on three aspects: first, improving the institutional mechanism for low-altitude management. The second is to build an information-based low-altitude governance system. Thirdly, it will actively promote the construction of application pilots. Pilot applications will be carried out in regions with better information infrastructure, relying on the construction of low-altitude intelligent networking to promote industrial upgrading strategies, establish a standardized system, incubate the scale of market operations, promote the in-depth development of military-civilian integration in the UAV industry, and guide the development of industrial applications and ecological rational layout. To summarize, by continuing to deepen the reform of low altitude airspace management, accelerating the new infrastructure of low altitude intelligent networking, actively promoting the upgrading and development of the drone industry, striving to innovate the "drone+" technology and application mode, and continuously enhancing the vitality of the drone industry ecosystem, mankind is bound to usher in a new scene of low altitude economic development with the support of the drone industry.

5. Conclusions

Low-altitude intelligent networking is a product of the evolution of networked, digitalized and intelligent convergence development, inseparable from the networked, digitalized, intelligent and other disruptive advances in technology, artificial intelligence at the top of the disruptive technologies. It should be seen that we are still a long way from the real practical artificial intelligence, in this context, the construction of low altitude intelligent network is bound to be a extremely challenging direction. However, it will also be the development of future of new energy and low altitude economic.

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