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Discussion on the New Layout Demand and Development Trend of China's New Energy Vehicle Industry under Green Economy

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Abstract: As global environmental challenges intensify and the concept of sustainable development gains traction, the rise of the green economy emerges as a pivotal trend in the 21st century. Against this backdrop, China's new energy vehicle (NEV) industry is presented with a fortuitous opportunity characterized by supportive policies, burgeoning market demand, and technological innovation. New energy vehicles serve not only as the quintessential instrument for emission reduction within the transportation sector but also as an essential force driving energy transformation and economic restructuring. Currently, China stands as the largest market for new energy vehicles worldwide; however, to sustain a competitive edge on the international stage, it is imperative to undertake a comprehensive realignment of the industry's framework. This entails adhering to stringent environmental regulations, responding to the exigencies of energy structural transformation, and achieving efficient synergy across the upstream and downstream supply chains. This study aims to systematically analyze the current state of the industry, exploring strategies to bolster core competitiveness under the guidance of a green economy and anticipating future industry trends, thereby providing strategic direction for realizing dual benefits in both economic and environmental dimensions.

1. Introduction

The intensification of global climate change has compelled nations to reassess their economic development models, with the concept of green economy gaining widespread acceptance. As the largest developing country, China faces the dual challenges of environmental protection pressures and the transition to alternative energy sources. Consequently, the new energy vehicle industry has been strategically promoted. This development is not only pivotal to transportation and environmental conservation but also integral to national economic growth, technological innovation, and the enhancement of international competitiveness. Driven by policy support and technological advancements, China has progressively established a comprehensive new energy vehicle industry chain and aims to further focus on intelligence, electrification, and connectivity. Against this broader backdrop, this article will meticulously analyze the emerging demands for a novel strategic approach within the new energy vehicle industry and delineate its development trajectory in light of

shifting market demands, technological innovations, and international collaborations.

2. Current Situation of China's New Energy Vehicle Industry

2.1. Comparison of Domestic and International Markets

In the new energy vehicle market, there is a striking contrast between Chinese and foreign markets. China has emerged as the world's largest producer and consumer market for new energy vehicles, a rapid ascent fueled by robust policy support and an immense consumer base. Domestically, sales of new energy vehicles have been soaring year after year, with particularly remarkable performance from mid-to-low end electric models. Electric vehicles have been widely adopted in urban taxis and car-sharing services. Furthermore, Chinese new energy vehicle manufacturers, such as BYD and NIO, have gradually penetrated the global market and secured a foothold in international competition by continually enhancing their battery technology and intelligent driving systems. In comparison, although the European and American markets started earlier, their growth rate has been relatively sluggish. These regions exhibit a strong demand for high-end new energy vehicles, with brands like Tesla and Porsche dominating this segment. In these areas, consumers have more stringent requirements for vehicle range and charging infrastructure, and governments impose rigorous regulations on carbon emissions and environmental protection. These factors contribute to a slower market growth rate. However, Europe and America remain at the forefront of core technological research and development in new energy vehicles, especially in power batteries and autonomous driving technology, where their innovations continue to set global trends. While China holds an advantage in market size, there is still room for improvement in terms of technological self-innovation and international brand influence. To establish themselves in the global market, Chinese companies need to achieve further breakthroughs in high-end technologies.

2.2. Production and sales volume and market share

In recent years, the production and sales of new energy vehicles (NEVs) in China have experienced explosive growth, propelled particularly by policy subsidies and a heightened consumer awareness of environmental protection. By 2023, the annual sales of NEVs in China have surpassed several million units, firmly securing the country’s position as the global leader. This not only reflects the immense market potential domestically but also signifies a gradual recognition by consumers of new energy technologies. Concurrently, the market share is expanding rapidly, representing a significant portion of the global NEV market. From a branding perspective, domestically produced brands have made considerable strides in market share, with companies such as BYD, NIO, and XPeng successfully establishing themselves as leaders in the worldwide NEV arena, particularly excelling in the mid to low-end segments. In contrast, traditional fossil fuel vehicle manufacturers have made relatively sluggish progress in their transition to new energy, with their market shares gradually eroded by emerging NEV brands. This shift reflects a gradual transformation in consumer preferences towards green transportation and underscores the competitive advantages of NEVs in terms of technology, range, and pricing. However, despite the rapid growth in production and sales, the market continues to face structural challenges. The large proportion of the mid to low-end market coupled with relatively subdued demand in the high-end segment results in overall profit margins that are less than desirable [1].

2.3. Technological Progress and Innovation Capability

In recent years, the technological advancements and innovative capabilities within China's new

energy vehicle industry have achieved remarkable breakthroughs, becoming a significant driving force behind market expansion and industrial upgrading. The development of battery technology, particularly the advancements in lithium iron phosphate batteries and ternary lithium batteries, has provided electric vehicles with extended ranges and heightened safety. Byd's innovation with blade batteries has significantly enhanced energy density and stability, setting a new benchmark for the industry. The progress in intelligent driving technologies has also positioned Chinese automakers favorably in the autonomous driving sector, with advanced driver-assistance systems (ADAS) and vehicle-to-infrastructure technologies being rapidly adopted. The integration capabilities of domestically produced new energy vehicles in both hardware and software have been continuously strengthening; many enterprises have achieved deep integration from component design to overall vehicle control, substantially elevating product performance and user experience. Simultaneously, the combination of information technology and new energy has been advancing, with the development of vehicle-to-network technologies transforming new energy vehicles from mere modes of transportation into integral parts of intelligent mobile terminals, revolutionizing travel. Although Chinese enterprises have achieved global leadership in certain areas, there remains a gap in core technologies such as power systems, semiconductor chips, and high-performance batteries compared to international leading standards. Facing intense global market competition, the enhancement of independent innovation capabilities remains crucial for future development. The continuous progress in technology and the accumulation of innovative capabilities will determine whether China's new energy vehicle industry can truly transition from scale advantages to quality and technological superiority.

3. New layout requirements under green economy

3.1. Environmental policies and regulatory requirements

In the context of the green economy, the increasingly stringent environmental policies and regulations have become an indispensable and significant force shaping the strategic positioning of China's new energy vehicle industry. The introduction of various policies, particularly those imposing strict requirements on carbon emissions and pollution control, has directly propelled the rapid development of new energy vehicles. The improvement of urban air quality, the objective of reducing carbon emissions, and the tangible pressure of global climate change are compelling enterprises to transition towards new energy sources. This trend not only influences the production plans of automobile manufacturers but also imposes more stringent green and environmentally friendly requirements on component suppliers within the supply chain. More profoundly, these regulatory requirements extend beyond mere emission control to encompass the entire environmental performance lifecycle of vehicles—from energy consumption and pollution during the manufacturing process, to energy efficiency during usage, and finally to the end-of-life disposal and recycling stages. For automakers, this means considering a holistic environmental impact rather than simply launching a new energy vehicle that meets standards. The pressure on traditional fuel car manufacturers to transform is evident, while emerging new energy vehicle manufacturers gain broader development opportunities under the policy-driven environment. At the same time, the convergence of international environmental regulations also influences the Chinese market to some extent [2]. As global environmental standards gradually align, Chinese automakers face the need for greater adaptability when entering international markets. This is not merely a domestic industrial layout issue but also an inevitable challenge when venturing into the global market. The environmental policies will continue to profoundly impact every aspect of the new energy vehicle industry in the future, prompting enterprises to seek more opportunities for innovation and breakthroughs in the new environment.

3.2. Demand for energy structure adjustment

Under the wave of green economy, China's new energy vehicle industry is confronting the pressing need for energy structure adjustment. Traditional fossil fuels, which have long dominated the energy landscape, are increasingly revealing their limitations in resources and their detrimental impact on the environment. To achieve sustainable development, the substitution of traditional energy with new energy has become an inevitable trend. As a pivotal component of this shift, new energy vehicles not only transform people's modes of transportation but also impose new demands on the overall energy consumption structure. The utilization of renewable energies such as wind and solar power offers greater possibilities for green electricity to fuel these vehicles, thereby contributing to a reduction in carbon dioxide emissions throughout the lifecycle of electric vehicles, truly achieving green and environmental protection "from source to wheel." The integration of electric vehicles with renewable energies will provide a clean and efficient model of energy utilization, facilitating the green transformation of the economy. The construction of new energy charging infrastructure is also gradually aligning charging stations with renewable energy sources, offering drivers greener travel options. However, the process of adjusting the energy structure is by no means straightforward, involving not only technological innovations but also profound shifts at the socio-economic level. The existing interests of traditional energy industries, the compatibility of infrastructure, and the enhancement of grid intelligence are all challenges testing the acceleration of this process. Nonetheless, it is foreseeable that with continuous technological innovations and robust policy support, the adjustment of the energy structure will infuse new vitality into the new energy vehicle industry and make a positive contribution to realizing the vision of ecological civilization.

3.3. Industry chain synergy and optimization

In the context of green economy initiatives, the advancement of China's new energy vehicle industry hinges on the synergy and optimization of its supply chain. Each segment of the supply chain, from component manufacturing and supply chain management to final assembly, must achieve efficient coordination under the backdrop of green transformation. Power batteries, as the core component of new energy vehicles, significantly influence the industry's green development through their raw material sourcing, production processes, and post-use recycling. Ensuring the environmental friendliness and sustainability of upstream material supplies is not only driven by market demands but also a necessary choice in addressing environmental pressures. The efficient coordination of the supply chain also directly impacts the manufacturing costs and market competitiveness of new energy vehicles. In the increasingly complex global supply chain landscape, especially in the face of critical component shortages such as semiconductors, achieving supply chain resilience and flexibility is a critical consideration for automakers. Deep collaboration between vehicle manufacturers and upstream suppliers can enhance efficiency, reduce resource waste, and propel the entire supply chain towards a more environmentally friendly and energy-saving direction. In this collaborative development, the application of emerging technologies plays a pivotal role. Technologies such as big data and artificial intelligence are offering new opportunities for optimizing the new energy vehicle supply chain. By accurately forecasting market demand, optimizing resource allocation, and integrating information flows across upstream and downstream enterprises, the overall operational efficiency of the supply chain can be significantly improved. As the synergy and optimization of the supply chain continue to deepen, the overall competitiveness and sustainable development capabilities of the new energy vehicle industry are poised for a transformative leap [3].

4. Development Trend Forecast and Strategy Suggestion

4.1. Market Demand Forecast

With the growing global awareness of environmental protection and the continuous increase in policy support, consumers' demand for green transportation has been soaring. The acceleration of urbanization and the improvement of public transportation infrastructure have also fostered a robust demand for new energy vehicles (NEVs). Consumer purchasing attitudes are gradually shifting towards eco-friendliness and efficiency, especially among the younger generation, who seek a combination of technological sophistication and environmental consciousness. This has led to an increasing appreciation for the advantages of NEVs in terms of zero emissions and intelligent capabilities. The escalating issues of urban traffic congestion and environmental pollution have further hastened the adoption pace of NEVs. An increasing number of cities are implementing restrictions on fuel-powered vehicles while encouraging the use of new energy vehicles, making them the preferred choice for urban mobility. Moreover, as electric vehicle technology matures, consumers' concerns about battery life, charging time, and range are diminishing, prompting more individuals to opt for NEVs for their daily commutes. Simultaneously, with the gradual decrease in the cost of NEVs, the expansion of production scale and technological advancements have led to a year-on-year decline in their prices. Consumers are now attracted to NEVs not only out of a sense of environmental responsibility but also due to their economic viability. The affordability of these vehicles is converting previously hesitant consumers into actual buyers, further driving market demand. In the long term, NEVs are poised to become more than just a means of transportation; they will offer a mobile intelligent living platform. Advancements in Internet of Vehicles (IoV) technology and autonomous driving will imbue NEVs with greater technological content and utility value. These innovative features will serve as significant drivers for the sustained growth in market demand. It is foreseeable that with policy guidance, increasing market awareness, and the improvement of charging infrastructure, the growth in NEV market demand will remain steady and may even experience explosive growth in the near future. The immense potential for future market expansion of NEVs also implies a comprehensive upgrade of the industry, from manufacturing to services, bringing new opportunities and challenges to the entire supply chain.

4.2. Direction of technological innovation and breakthrough

With the escalating global demands for environmental protection and the rising expectations of consumers for high-performance vehicles, the new energy vehicle industry is facing an urgent mission to continually break through technological barriers. In this process, the breakthrough in battery technology is undoubtedly of paramount importance. Efficient, long-life batteries are the key to enhancing the driving range and user experience of new energy vehicles. The development of solid-state battery technology, which is characterized by higher energy density and safety, is garnering significant attention and offers new possibilities for future electric vehicles. Innovation in the powertrain system is equally crucial. The integration and efficiency of electric drive systems not only enhance the overall energy efficiency ratio but also significantly reduce production costs. The application of new materials in this field is continuously advancing, with the use of lightweight and high-strength materials contributing to reduced vehicle weight while improving both driving range and handling performance. Meanwhile, the rapid advancement of intelligent technology is adding considerable value to new energy vehicles. The evolution of autonomous driving technology and the maturity of vehicle-to-everything (V2X) technologies are transforming new energy vehicles from mere means of transportation into mobile smart terminals. The intelligence and convenience of charging infrastructure have once again become an indispensable direction of innovation. The

integration of renewable energy sources and the construction of smart grids provide green and efficient solutions for electric vehicle charging. Optimizing the allocation of charging resources through intelligent scheduling systems can not only alleviate charging pressures but also reduce overall usage costs, thereby enhancing user satisfaction. In the coming years, with the deep development of 5G communication, big data, and artificial intelligence technologies, the technological innovation in the new energy vehicle industry will experience unprecedented opportunities. The convergence of these technologies will bring about new user experiences and catalyze more intelligent and personalized application scenarios. Looking ahead, through continuous technological innovation, China's new energy vehicle industry will not only achieve breakthroughs domestically but also occupy a significant position in the global market, leading the green transformation and intelligent upgrade of the industry [4].

4.3. Internationalization and Cooperation Opportunities

As the world's largest producer and consumer of new energy vehicles, China possesses a robust industrial foundation and a leading technological edge, establishing itself as a significant participant and driving force in the global electric vehicle market. In this journey, Chinese enterprises have progressively strengthened their collaborations with the global automotive industry. In the face of varying policies, market demands, and cultural differences across countries and regions, transnational cooperation not only enhances the brand influence of Chinese companies but also enables them to secure greater resources and market shares in the realm of international competition. The new energy vehicle market holds vast potential in regions like Europe and Southeast Asia, bolstered by proactive governmental support for clean energy policies. Through partnerships with local automotive firms, Chinese enterprises can swiftly integrate into these markets and build formidable international competitiveness via collaborations in technology, capital, and supply chains. The quest for international expansion transcends mere market enlargement; it represents a reconfiguration of global resources. By engaging in international collaboration, Chinese new energy vehicle companies can expedite technological innovation and optimize supply chains, particularly in the global procurement and research and development of critical components and raw materials, thus leveraging external resources to elevate their technical capabilities. Furthermore, through alliances in overseas markets, Chinese firms can absorb leading international management practices and cutting-edge market trends, contributing wisdom and strength to the global green economic transition. In the future, the pursuit of an international presence will not only boost the global market share of Chinese new energy vehicle enterprises but will also become a vital engine for driving the green transformation of the global automotive industry. The complexity and diversity of international markets imply that new energy vehicle companies must respond with greater agility to the challenges of globalization, thereby propelling the Chinese new energy vehicle sector toward continuous advancement and more profound sustainable development on the global stage.

4.4. Government Role and Policy Recommendations

As a pivotal force in the green economy, the government serves not only as the architect of policies but also as the guide and overseer of market norms. Through a judicious policy framework and market direction, the government can offer steadfast and robust support for the healthy development of the new energy vehicle (NEV) industry. Strategic planning and policy incentives at the national level have become the bedrock of the NEV industry's rapid evolution. The government's role extends across multiple dimensions, requiring not only the formulation of macroeconomic strategies but also the support and guidance of key segments within the supply chain. The NEV industry is a complex system, encompassing elements from raw material sourcing

and breakthroughs in battery technology to the construction of charging infrastructure, each facet necessitating precise policy support. By optimizing resource allocation, the government can furnish a conducive environment for enterprise development, propelling the research and application of new energy technologies, thus accelerating technological iterations within the industry and enhancing market efficiency. Moreover, the government's guidance at the consumer level is equally crucial. The proliferation of NEVs hinges on expanding market demand, and the government, through fiscal incentives and subsidies, can effectively ignite consumer enthusiasm, thereby driving sustained growth across the entire sector. By steering market demand, the government is, in effect, laying a solid foundation for the future development of the NEV industry [5]. Additionally, the government's role encompasses fostering international collaboration and harmonizing global standards. In an era of globalization, as China's NEV industry navigates the international market, it must navigate diverse national standards and regulations, where the government's diplomatic and policy coordination capabilities are indispensable.

5. Conclusion

Amidst the sweeping tide of the green economy, China's new energy vehicle industry is undergoing a crucial phase of development. Despite facing the dual challenges of technological breakthroughs and market competition, the innovation and optimization of industrial layout are of paramount importance. In the future, as technology continues to advance and international cooperation deepens, new energy vehicles will maintain their pivotal role in pioneering sustainable transportation solutions. The government must make more precise adjustments regarding the continuity of supportive policies, the intensity of incentives, and market oversight to effectively foster the healthy growth of the industry. By optimizing the energy structure, enhancing the collaborative efficiency of the industrial chain, and boldly pursuing technological breakthroughs, China's new energy vehicle sector is poised to achieve remarkable progress, contributing significantly to global emissions reduction and the advancement of the green economy. This process not only pertains to China's development but also represents an indispensable element in the broader context of global sustainable economic landscapes.

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