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Study on Development Suggestions for the Key Parts Industry Chain of China's New Energy Vehicles

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ABSTRACT

The development of new energy vehicles is the inevitable path for China's automotive industry to transition from being a large player to a powerful one. This article focuses on analyzing the current development status of China's automotive industry, particularly in the realm of new energy vehicles. It examines the domestic market situation and export competition landscape of new energy vehicles, further evaluating the current status of the new energy vehicle industry chain, technological situation, enterprise competition landscape, and the regional distribution pattern of core components. Finally, based on the problems existing in the development of the new energy vehicle industry chain, it puts forward targeted development suggestions.

KEYWORDS

New energy vehicles; Industry chain; Regional distribution; Development suggestions

1. INTRODUCTION

The development of new energy vehicles is the inevitable path for China to transition from being a large automotive producer to a powerful automotive nation [1]. After years of industrial cultivation, China's new energy vehicle industry has made rapid progress, with production and sales ranking first in the world for nine consecutive years, demonstrating a first-mover advantage in the global automotive industry, leading the world in industrial scale and technological level, and continuously improving the completeness of the industry chain, becoming a core force driving the global transformation of the new energy vehicle industry [2]. While China's automotive industry chain has made significant progress, it still faces core issues such as insufficient core technology and foreign constraints on basic components and core materials [3]. With the accelerating transformation of the global automotive industry and the increasingly complex international situation, it is urgent to conduct an in-depth analysis of the strengths and weaknesses of China's automotive industry and put forward practical development suggestions based on the core issues, to help China's new energy vehicle industry chain achieve independent and controllable development, laying a solid foundation for China to become a powerful country in the new energy vehicle industry.

2. ANALYSIS OF THE CURRENT DEVELOPMENT STATUS OF CHINA'S NEW ENERGY VEHICLE INDUSTRY

Affected by multiple economic and trade factors, China's automotive market has entered a deceleration and adjustment phase since 2018, but sales have still remained the world's first for 12 consecutive years [4]. In 2023, China's automobile sales reached 30.094 million, an increase of 12%

year-on-year, accounting for 33.7% of the global market share, surpassing the 2018 sales of 28.88 million and setting a new record [5]. The sales momentum continued to be strong in 2024, with sales reaching 6.72 million in the first quarter, an increase of 10.6% year-on-year. Driven by stricter environmental protection policies, the "dual carbon" goals, energy consumption "dual control," and a new round of technological revolution and industrial transformation, the integration of the automotive, energy, transportation, and information communication sectors has been promoted, leading to an accelerated transition of the industry from quantitative growth to qualitative improvement. In addition, in recent years, domestic brands have accelerated brand cultivation, launched high-end brand strategies, and continuously promoted brand upgrading and high-quality product development [6].

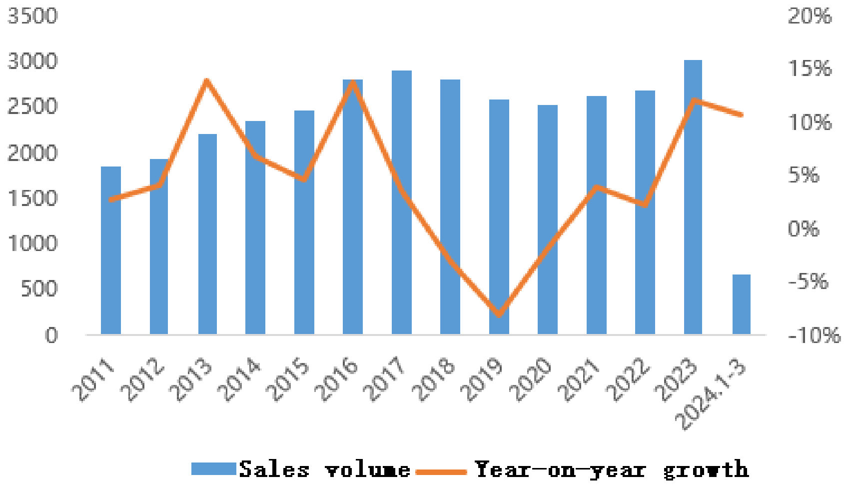

Figure 1. China's Automobile Sales Over the Years

In 2023, China's new energy vehicle sales reached 9.495 million, an increase of 37.9% year-on-year, with the penetration rate increasing to 31.6%, accounting for 66.5% of the global new energy vehicle market share, demonstrating strong competitive advantages. From January to March 2024, China's new energy vehicle sales continued to grow rapidly, reaching 2.09 million, an increase of 31.8% year-on-year, with a penetration rate of 31.1%. Overall, China's new energy vehicle industry has achieved leapfrog growth in recent years, with sales ranking first in the world for ten consecutive years [7]. With the improvement of the new energy vehicle usage environment and the transition of the market from policy-driven to market-driven expansion, it is expected that China's new energy vehicle sales will reach 12 million in 2025, with the penetration rate expected to increase to 40%; by 2035, all public vehicles in China will achieve full electrification, becoming an important force leading the transformation of the global automotive industry [8].

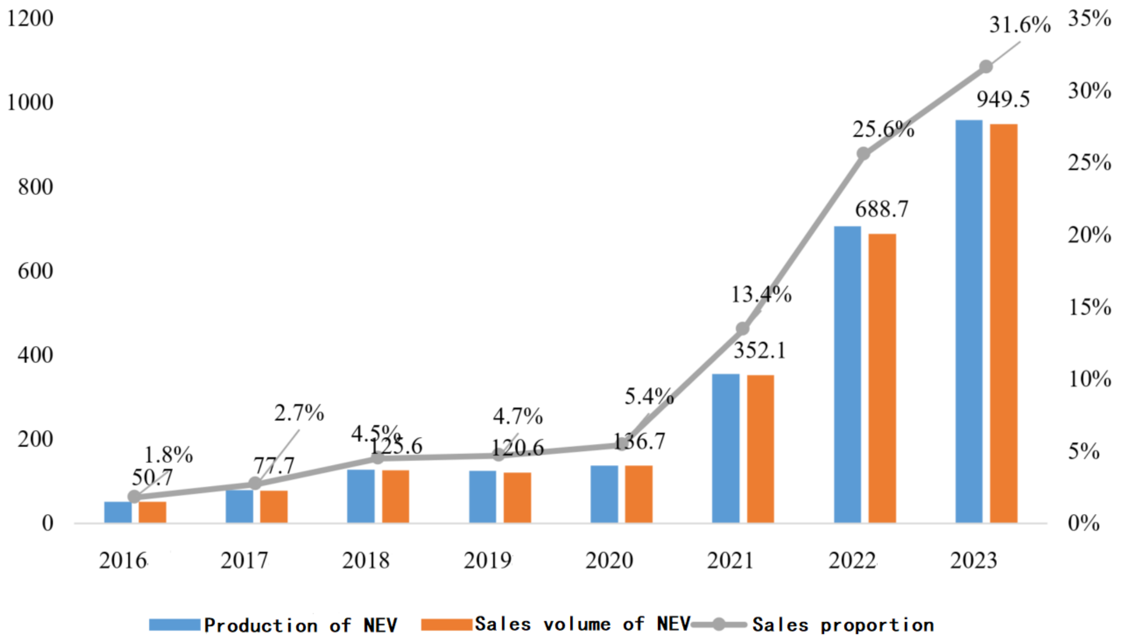

Figure 2. Sales volume and market penetration rate of new energy vehicles in China over the years

3. ANALYSIS OF THE CURRENT SITUATION OF CHINA'S NEW ENERGY VEHICLE EXPORTS

In 2023, China exported 1.68 million new energy passenger vehicles, accounting for 40% of passenger vehicle exports. New energy has become the core driving force for China's automobile exports. From the perspective of energy types, more than 90% of China's exports of new energy vehicles are pure electric passenger vehicles. However, in terms of monthly sales, the proportion of plug-in hybrid vehicles is gradually increasing, and China's plug-in hybrid vehicles are gaining recognition in overseas markets [9].

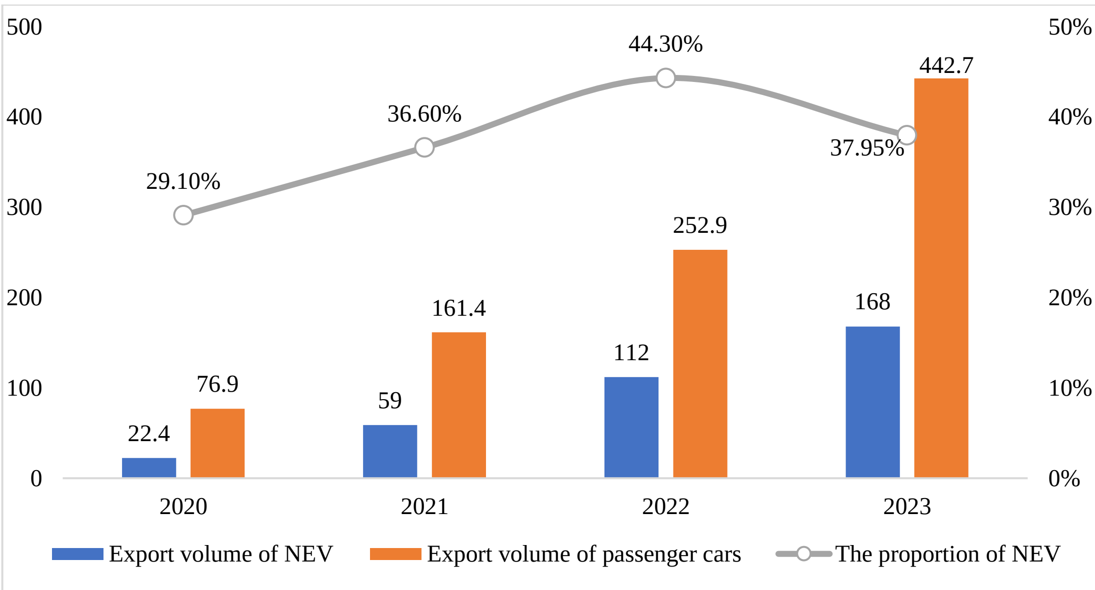

Figure 3. Export scale and proportion of new energy passenger vehicles in China (10000 units)

Table 1. Export volume of various new energy vehicle models in recent years (10000 units)

Year	ICE	BEV	PHEV	Total export volume
2018	101	14	0	115
2019	99	25	0	124
2020	87	19	2	108
2021	166	50	4	220
2022	232	99	9	340
2023	350	158	14	522

Based on the industrial chain advantages, cost advantages, and technological advantages formed by China in the field of new energy vehicles, new energy vehicles have successfully entered the European market and have the largest export scale to Belgium. In 2023, the number of new energy vehicles exported to Belgium reached 195000. However, considering that Belgium is the largest transit port in Europe, new energy vehicles are mainly transshipped in Belgium and sold to other countries. In addition, Southeast Asian countries, especially Thailand and the Philippines, are also key exporters of new energy vehicles in China [10].

Table 2. Ranking of Top 20 Countries in China's New Energy Passenger Vehicle Export Scale in 2023

Sort	Country	Export volume (vehicles)	Export proportion	Export amount (Ten thousand US dollars)	Proportion of export amount	Average export price (USD)
1	Belgium	195,421	11.6%	560,069	14.6%	28,660
2	Thailand	156,702	9.3%	246,819	6.4%	15,751
3	Britain	137,388	8.2%	473,564	12.3%	34,469
4	the Philippines	115,795	6.9%	10,079	0.3%	870
5	Spain	95,738	5.7%	304,925	7.9%	31,850
6	Australia	88,309	5.2%	240,177	6.3%	27,197
7	Brazil	67,552	4.0%	152,339	4.0%	22,551
8	India	58,577	3.5%	9,961	0.3%	1,701
9	Netherlands	55,115	3.3%	123,951	3.2%	22,490
10	Israel	51,558	3.1%	130,147	3.4%	25,243
11	Bengal	49,957	3.0%	3,882	0.1%	777
12	Germany	47,129	2.8%	154,349	4.0%	32,750
13	Uzbekistan	43,128	2.6%	96,277	2.5%	22,324
14	Canada	41,144	2.4%	166,383	4.3%	40,439
15	France	38,314	2.3%	58,247	1.5%	15,203
16	UAE	36,284	2.2%	80,376	2.1%	22,152
17	Slovenia	34,943	2.1%	116,538	3.0%	33,351
18	Türkiye	33,059	2.0%	31,218	0.8%	9,443
19	Kyrgyzstan	24,068	1.4%	107,963	2.8%	44,857
20	Korea	21,390	1.3%	54,915	1.4%	25,673

From the perspective of automobile exports from various provinces, Shanghai accounted for 18.1% of the total domestic automobile exports in 2023, mainly due to the strong and numerous local enterprises in Shanghai, especially SAIC Group and Tesla; Anhui Province ranks second in terms of export volume among all provinces, mainly due to the sharp increase in local Chery's automobile export volume, which has driven the rapid growth of local automobile exports.

Table 3. The proportion of automobile exports from top provinces and cities in recent years (%)

provinces	2020	2021	2022	2023
Shanghai	19.3	22.5	23.6	18.1
Anhui	9.4	11.1	11.3	14
Zhejiang	9.1	8.5	8.5	7.7
Hebei Province	9.3	8.2	5.5	7.2
Chongqing	8.8	9	8.4	7
Shandong Province	9.8	9.8	8.1	5.6
Jiangsu Province	5.8	5.1	4.4	4.9
Guangdong	2.2	1.7	3.3	4.6
Henan Province	1.5	1.1	3.2	4
Guangxi	3.5	4.5	4.4	3.8
Beijing	5.9	4.1	3.1	3
Jiangxi	2.3	1.9	1.9	2.8
Hubei Province	1.2	2.7	3.1	2.8
Sichuan	3.8	1.9	1.9	2.4
Hunan	0.6	0.7	1.1	1.9
Jilin	1.2	1	1.1	1.9
Shaanxi	1.3	1.2	0.9	1.8
Fujian	2	0.8	0.8	1.7
Tianjin	0.4	1.7	2.2	1.4

4. ANALYSIS OF THE CURRENT DEVELOPMENT STATUS OF CHINA'S NEW ENERGY VEHICLE INDUSTRY CHAIN

With the expansion of the automotive market and the rapid growth of global procurement, China's automotive parts industry supply system is gradually improving, forming the world's largest, complete category, and complete supporting industrial ecosystem. There are over 100000 domestic parts enterprises and 13285 large-scale enterprises. Major international parts enterprises have established production and research and development bases in China.

Our country's component product categories have basically covered the entire supply chain of automotive components such as power systems, body systems, automotive electronics, chassis, and new energy, effectively supporting the backbone of China's automotive industry. Domestic leading component companies have basically possessed complete forward research and development capabilities such as design matching, performance development, and testing, and have achieved a transformation from a single product to a modular platform.

Figure 4. Overall situation of Chinese component enterprises

With the assistance of electrification, intelligence, and networking, the number of enterprises engaged in new energy and intelligent networking has achieved rapid growth. The number of new energy related components enterprises has reached 700, a year-on-year increase of 40.8%, and the main business revenue is about 350.73 billion yuan, a year-on-year increase of 63.6%; There are more than 1300 large-scale enterprises related to intelligent networking, an increase of 18% year-on-year, with main business revenue of approximately 344.66 billion yuan. From the perspective of the proportion of output value, the main business revenue of new energy and intelligent networking accounts for approximately 19.2% of the overall main business revenue of components.

From the perspective of the value of various components, the engine is the most valuable system in traditional vehicles. The cost of traditional fuel passenger car engines accounts for about 15%, while the body, automotive electrical and electronic components, chassis, transmission system, and interior and exterior decoration also account for a relatively high proportion in the value of traditional fuel vehicles, which are about 15%, 15%, 10%, 10%, and 10% respectively. In the field of new energy, the core components mainly include batteries, electric drive systems, and electronic control. Among them, batteries account for about 30% -40% of the total cost, and motors account for about 10%. With the deepening of low-carbon, intelligent, and networked concepts, new energy and intelligent connected vehicle related components will achieve explosive growth, and the output value will also achieve significant improvement.

Driven by the national strategy of comprehensively developing new energy vehicles, China has a complete system of new energy components and obvious advantages in the industrial chain compared to other countries. However, in key technological fields such as collectors and IGBT/SiC equipment, there are obvious shortcomings in the industrial chain. Segmented field analysis shows that the main components of power batteries, such as positive and negative electrodes, separators, and electrolytes, can be independently developed and produced domestically. The gap in production level and product quality with foreign countries is gradually narrowing, and it basically meets the needs of domestic industrialization. However, there are still gaps in high-end separators, battery cell energy density, cost-effectiveness, product quality stability, and consistency; The driving motor technology is mature, and the peak power, speed, and continuous power density are on par with advanced levels. Key components of the driving motor, such as permanent magnet materials, can be independently developed and produced domestically; Electric control and BMS systems can gradually be developed and produced domestically, and IGBT modules and electronic and electrical integration technology are gradually breaking through foreign monopolies to achieve independent supply. However, the precision control performance lags significantly behind the advanced level of foreign countries, and power electronic device chips rely on foreign enterprises.

In some links of the fuel cell vehicle industry chain, although enterprises have made some layout, there is also a lack of high-quality enterprises, and product competitiveness is weak. The main problem lies in the weak underlying technical architecture. The completeness and technological level of the industrial chain are relatively backward compared to Japan and South Korea.

5. ANALYSIS OF THE LAYOUT OF CORE COMPONENTS FOR NEW ENERGY VEHICLES IN CHINA

From the layout of core enterprises in electric motors and electronic control systems in various provinces, as of the end of 2023, Jiangsu Province has the largest number of enterprises, reaching 88, with many leading enterprises such as Bosch, NIO Power, Siemens Electric, and strong competitiveness; Guangdong Province, driven by complete vehicle enterprises such as BYD and GAC, has also formed an industrial chain cluster for electric motors and electronic control systems. The number of core enterprises has reached 56, with leading enterprises such as Fudi Power, Dayang Electric, and Huichuan Technology; Shanghai ranks third with 50 core enterprises; Zhejiang ranks fourth with 46 core enterprises.

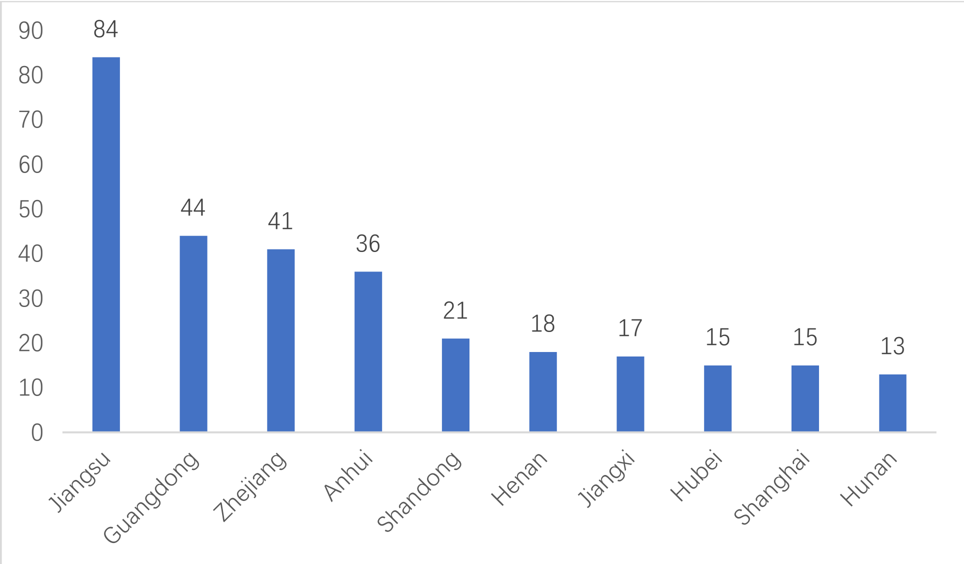

Figure 5. Number of core electric vehicle drive motor and electronic control enterprises in the top 10 provinces

Driven by new energy vehicles, the power battery industry chain in various provinces is accelerating its improvement, and the layout of the power battery industry system is accelerating around vehicle enterprises. From the perspective of the layout of power battery enterprises in various provinces, Jiangsu Province has the largest number of core power battery enterprises, reaching 84, with leading power battery enterprises such as Guoxuan High tech, Xinwangda, Weiran Energy Storage, Honeycomb Energy, Zhongchuangxin Aviation, and Times SAIC, and has derived upstream battery suppliers such as Kanai New Energy around battery enterprises; There are about 44 core power battery enterprises in Guangdong Province, including leading enterprises such as Fodi Battery, Xinwangda, and Zhongchuangxin Aviation; There are approximately 41 power battery enterprises in Zhejiang Province; There are approximately 36 power battery enterprises in Anhui Province. Overall, there are many new energy vehicle enterprises in the Yangtze River Delta region, and the promotion effect is significant, effectively driving the upstream power battery industry chain to follow up.

6. SUGGESTIONS FOR THE DEVELOPMENT OF CHINA'S NEW ENERGY VEHICLE INDUSTRY CHAIN

Focus on key resources and ensure the development needs of the industry. Focusing on key resources in the new energy vehicle industry such as lithium, cobalt, and nickel, we will carry out long-term and national strategic reserve projects, guide enterprises to strategically layout and develop overseas and central and western raw material production capacity in various ways, and support the development of high-quality raw material enterprises. Continuously encourage the development of green and circular economy, and increase efforts to improve the system of power battery recycling and material extraction and utilization. Strengthen macroeconomic regulation of bulk raw material prices, maintain stable prices of battery grade lithium carbonate, automotive grade chips, and other raw materials and basic components, and ensure the stable development of the new energy vehicle industry.

Enhance the basic industrial capacity and the level of industrial chain development. Focusing on the basic materials, basic components (components), and key technologies related to automobiles, we will carry out centralized technological research and development, support basic research and breakthroughs in the industrial basic field, continuously improve technological level and manufacturing capabilities, and promote the formation of a comprehensive and strongly supported industrial basic system. Support industry university research cooperation, guide domestic and foreign enterprises to research and invest in weak links and areas of weakness in the domestic industrial chain, support component enterprises to establish innovation and industrialization alliances, achieve independent breakthroughs in a certain field of industrial chain, and build domestic substitution capabilities for key components.

Strengthen research and development innovation, accelerate the cultivation of backbone enterprise clusters. Focusing on the basic materials, basic components (components), and key technologies related to automobiles, we will carry out centralized technological research and development, support basic research and breakthroughs in the industrial basic field, continuously improve technological level and manufacturing capabilities, and promote the formation of a comprehensive and strongly supported industrial basic system. Support industry university research cooperation, guide domestic and foreign enterprises to research and invest in weak links and areas of weakness in the domestic industrial chain, support component enterprises to establish innovation and industrialization alliances, achieve independent breakthroughs in a certain field of industrial chain, and build domestic substitution capabilities for key components.

Support international cooperation in key technologies and industrial chains. Support enterprises to strengthen international technological cooperation, optimize global resource allocation through various means, strengthen joint innovation, joint research and development activities, introduce internationally advanced technological resources, select opportunities to achieve introduction, digestion, and innovation, and enhance the core competitiveness of enterprises. Support the internationalization and coordinated development of the new energy vehicle industry chain, deepen capital cooperation models, and jointly build a supply chain system; Improve the policy system for industrial internationalization, support component enterprises to enter the global supporting system, integrate into the global supply chain of international automotive companies, and drive the local component supporting system to move towards internationalization.

Promote the green and low-carbon development of the entire industry chain of new energy vehicles. Accelerate the research on policies and standards to support the green and low-carbon development of the entire automotive industry chain, establish a low-carbon development policy system linked to carbon emissions, and establish a unified automotive carbon emission accounting standard and carbon footprint certification and labeling system. Support enterprises to strengthen their carbon emission accounting and management capabilities, promote the construction of green manufacturing systems, encourage automotive industry chain enterprises to voluntarily certify their products with carbon labels, improve the level of resource recycling in the automotive industry, continuously optimize green supply chains, and build a low-carbon supply system. Through horizontal and vertical cooperation between the upstream and downstream of the industry chain, jointly promote carbon footprint management and achieve collaborative carbon reduction in the industry chain.

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