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Status and Market Evaluation for New Energy and Conventional Vehicles of China

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Abstract:

Contemporarily, China's automobile market has expanded rapidly and become one of the world's largest automobile producers and consumers. However, facing the environmental pressure and the demand of energy structure transformation, the automobile industry is experiencing a profound change from traditional fuel vehicles to new energy vehicles. This study analyzes the development status and market assessment of traditional fuel vehicles and new energy vehicles in China, and explores the changes and differences between the two. The sales of new energy vehicles show significant growth, and the market share is also rising year by year, while the sales of fuel vehicles show a downward trend. Despite the rapid expansion of the new energy vehicle market, it is still facing problems such as profitability issues, uneven investment in R&D, regulatory mechanisms to be improved and lagging infrastructure construction. In contrast, the fuel vehicle industry is gradually contracting amidst policy restrictions and changes in market demand, and companies need to accelerate their transformation and upgrading, and improve their research capabilities. China's automobile industry is in a key stage of transformation and upgrading. The traditional fuel vehicle industry needs to shift towards new energy, strengthen collaborative innovation, optimize industrial structure, and focus on the expansion of after-market services. Overall, China is expected to lead the global automotive industry in the direction of green, intelligent and low-carbon development, and realize the historic leap from a large automotive country to a strong automotive country.

Keywords: China's automobile market; new energy vehicle; conventional fuel vehicle.

1. Introduction

China‘s automobile industry started from scratch, experienced the process of introducing technology, imitating and learning to independent innovation and industrial upgrading, and has now become an extremely important pole in the global automobile industry. The history of China‘s automobile industry can be briefly summarized in the following key stages. The first stage is the budding period (1950s). At the early stage of the founding of New China, the automobile industry had a weak foundation; the First Automobile Manufacturing Plant (FAW) was established in Changchun in 1953, and the first „Jiefang“ truck was produced in 1956, marking an important starting point of the Chinese automobile industry. The second stage is the period of self-reliance (1960s-1970s). At this stage, China‘s automobile industry developed in a relatively closed environment, focusing on the production of trucks and buses, and also attempting to manufacture a small number of high-class sedans, such as the „Red Flag“ sedan, but the overall scale and technological level was limited. The third stage is the period of reform and opening up and joint venture wave (1980s-1990s). After the reform and opening up, China‘s automobile industry ushered in a major change. In 1984, Beijing Jeep became the first automobile joint venture, followed by the establishment of Shanghai Volkswagen, Guangzhou Peugeot, etc. The automobile industry introduced a lot of foreign technology and management experience, and promoted the entry of cars into families, and the scale of the industry expanded rapidly. The fourth stage is rapid growth (2000s-2010s). After joining the WTO, China‘s market further opened up, and automobile production and sales exploded, becoming one of the world‘s largest auto markets. During this period, the rise of independent brands such as Chery, Geely, BYD, etc., while the luxury car and SUV markets also began to flourish. The fifth stage is the transformation and upgrading and new energy stage (2010s to present). Facing environmental and energy challenges, the Chinese government vigorously promoted new energy vehicles and introduced a series of supportive policies. Tesla‘s construction of a factory in Shanghai signaled the increase of

foreign-funded new energy vehicles in the Chinese market, while BYD, Azalea, Xiaopeng and other companies led the development of electric vehicles and intelligent networked vehicles. China‘s automobile industry is transforming from a „manufacturing power“ to a „manufacturing power“, and is committed to technological innovation and green and low-carbon development.

As can be seen in Fig. 1, in 2009, China‘s automobile production and sales for the first time double breakthrough 10 million units mark to become the world‘s largest country of automobile production and sales. In 2013, the volume of production and sales exceeded 20 million units, in 2017, the volume of production and sales reached the peak of the stage, and then the market declined for three consecutive years, entering a period of transition and adjustment, in 2021, the end of the „three consecutive declines“ began to rebound. In 2023, China‘s annual automobile production and sales reached 30.161 million units and 30.094 million units respectively, an increase of 11.6% and 12% year-on-year, hitting a new record high and realizing double-digit growth, and for the 15th consecutive year ranked first in the world. After 70 years of hard work, China has built the world‘s largest, complete and complete automobile industry system, which not only provides a strong guarantee for convenient travel, but also provides important support for building a manufacturing power, and provides a strong driving force for overall economic and social and long-term development [1].

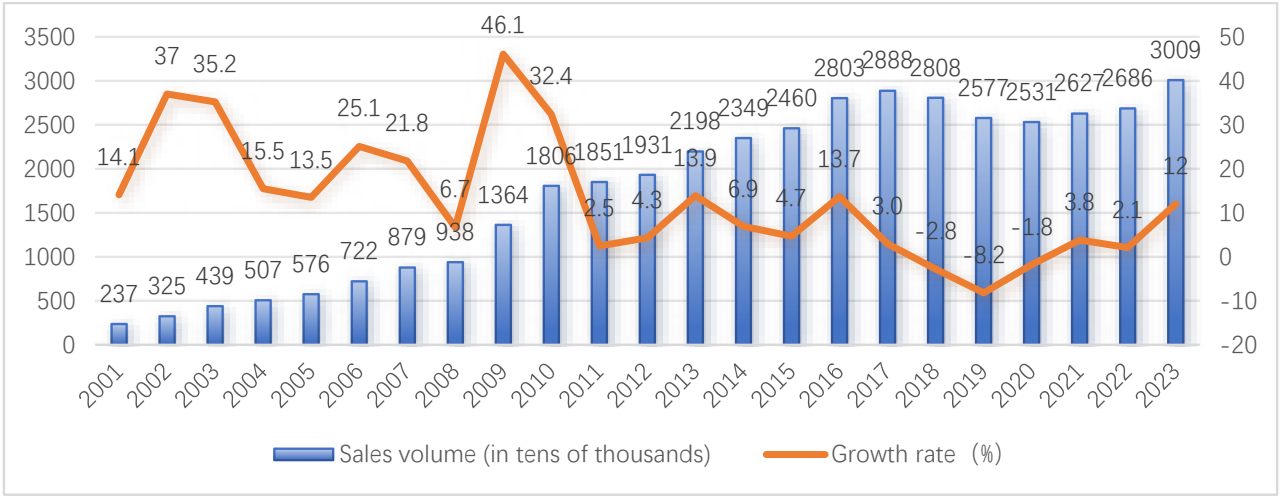


Fig. 1 China‘s Automobile Sales and Growth Rate, 2001-2023 (Data Source: China Association of Automobile Manufacturers)

Regarding the future path of the traditional automobile industry, Shao believes that with new energy vehicles gradually entering the market, China‘s traditional automobile industry has ushered in a difficult ice period [2]. China‘s traditional automobile enterprises should be oriented to improve scientific research and development capabilities, and should continue to promote transformation and upgrading based on a multi-movement approach to seize the strategic opportunity period, and proactively seek strategic development and leapfrogging, and should take the progress of the international advanced automobile enterprises as the direction of progress to the productivity of science and technology, and make efforts to build the first-class automobile industry in the world. For the development status of new energy automobile industry, Cheng Snuffan et al. believe that under the strong impetus of national policies, China‘s new energy automobile industry has been developing rapidly, and at the same time, there are also some problems [3]. At present, the new energy automobile industry has the problems of enterprise profitability difficulties, imbalance in the structure of R&D investment, unsound regulatory mechanism and imperfect infrastructure construction. Wang argues that the new energy automobile industry is characterized by low energy consumption and low pollution, which is an important part of achieving the goal of carbon neutralit [4]. However, China‘s new energy vehicles still have problems such as high selling price and usage cost, insufficient range, insufficient safety, and lack of enterprise core technology, which require increased investment in technological innovation and improved policy measures.

This paper mainly analyzes the development status quo of traditional fuel automobile industry and new energy automobile industry, and predicts its development trend through the comparison of the two, with a view to promoting the transformation of traditional automobile enterprises to new energy automobiles and making suggestions for the sustainable development of electrical automobile industry.

2. Analysis of New Energy Vehicle Industry

2.1 Status of Development

With the development of science and technology and the rising cost of fuel vehicles, consumer demand for new energy vehicles (hereinafter referred to as „NEVs“) has gradually increased, leading to the improvement of productivity of NEV enterprises and the rapid growth of NEV sales. According to the Fig. 2, China‘s NEV market will be 11,500 billion yuan in 2023, a year-on-year growth of 16.2%, and is expected to reach 2,311 billion yuan in 2025. In recent years, China‘s NEV production and sales have been maintaining rapid growth. In 2022, China‘s NEV production and sales were completed at 7.058 million units and 6.887 million units respectively, up 96.9% and 93.4% year-on-year. Data from China Association of Automobile Manufacturers (CAAM) shows that China‘s NEV production and sales in 2023 completed 9.587 million and 9.495 million, representing year-on-year growth of 35.8% and 37.9% respectively, ranking first in the world for nine consecutive years, as shown in Fig. 3.

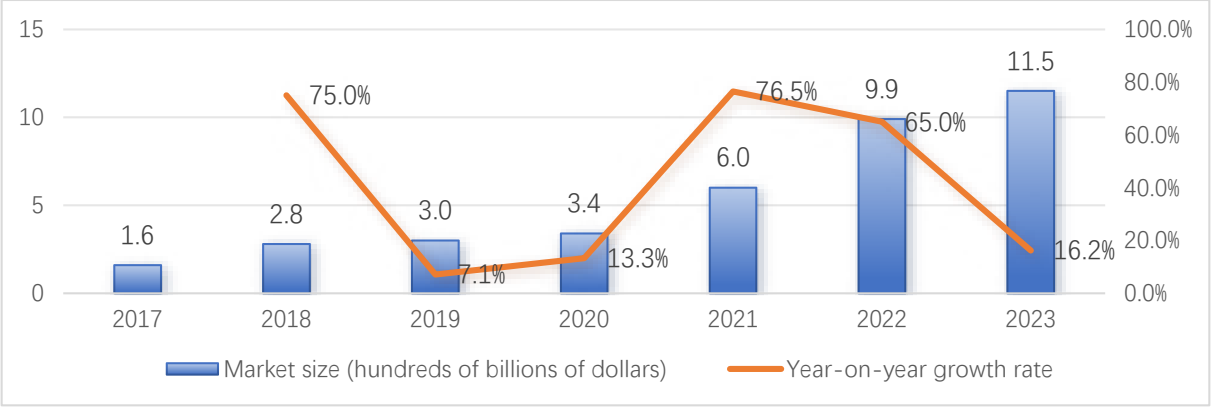
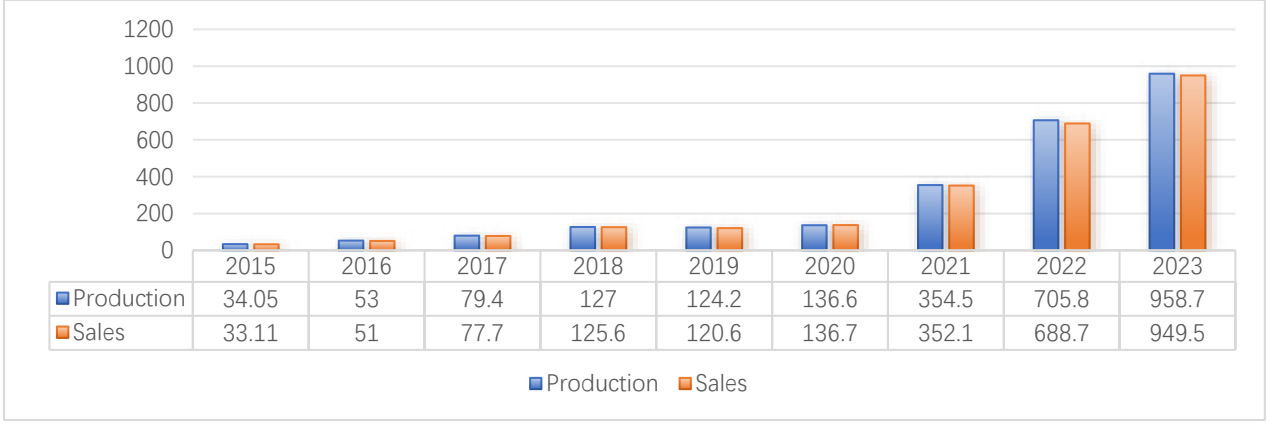


Fig. 2 China New Energy Vehicle Market Size, 2017-2023.



	2015	2016	2017	2018	2019	2020	2021	2022	2023
Production	34.05	53	79.4	127	124.2	136.6	354.5	705.8	958.7
Sales	33.11	51	77.7	125.6	120.6	136.7	352.1	688.7	949.5

Fig. 3 Production and Sales Volume of New Energy Vehicles in China, 2015-2023 (Unit: Unit: ten thousand vehicles).

China‘s NEV enterprises have accelerated their international layout and exported their products and technologies to the global market through overseas investment and plant construction. Since 2015, China‘s NEV exports have continued to climb, showing the growing competitiveness of China‘s NEVs in the international market. As shown in Fig. 4, in 2023, China‘s exports of NEVs reached 1.203 million units, up 77.6% year-on-year, leading the world in exports. The trade surplus of NEVs reaches $33.697 billion in 2023, an increase of $17.236 billion from 2022, showing the strong competitiveness of China‘s NEVs in the international market.

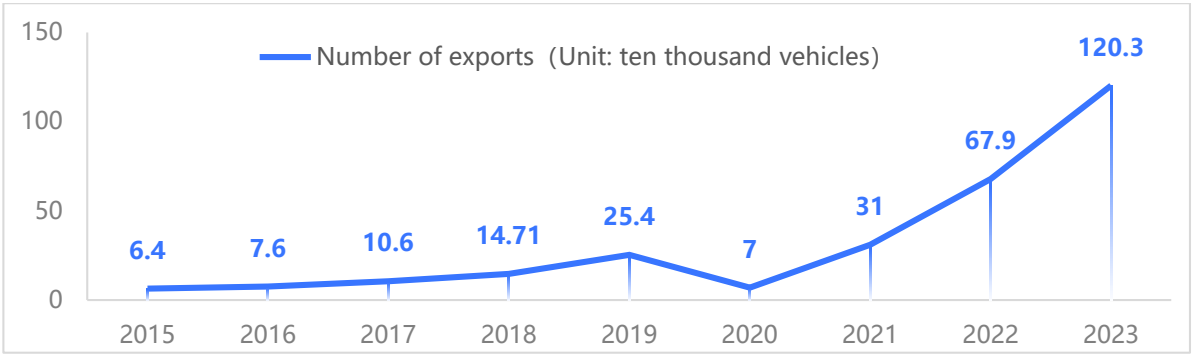


Fig. 4 2015-2023 China New Energy Vehicle Export Quantity

2.2 Existing Disadvantages

On the whole, relying on the more mature industrial chain and technology formed through continuous cultivation, China's NEV manufacturers may continue to improve their position in the global market. However, it is worth paying attention to is that the international mainstream car companies have released the long-term planning of electrification, and clearly take China as the potential largest market for electrification. It is expected that the electrification of joint venture enterprises will accelerate in the future, the market competition will become more and more intense, the market pattern is still unstable, NEV enterprises have not yet formed the absolute leading effect and scale advantage.

In addition, for some consumers, the uncertainty associated with new technology is a deterrent to the car-buying process. Fuel vehicles have a stable range that is unaffected by temperature and other factors, making them particularly suitable for long-distance travel, and they have stood the test of time in terms of performance, reliability and technology. NEVs, on the other hand, need more time to prove their reliability [5]. Among the issues that need to be urgently addressed are the shortened range and inadequate charging facilities. Second, although the range of NEVs is increasing, it still cannot meet consumers' needs for long-distance travel, especially in winter when the temperature drops, the battery range will be further shortened [6]. Moreover, China's charging infrastructure for NEVs still suffers from low numbers and uneven distribution, making it difficult for consumers to charge. As technology continues to evolve and drawbacks are progressively addressed, the automotive market will become richer and more flexible to accommodate different consumer needs and preferences.

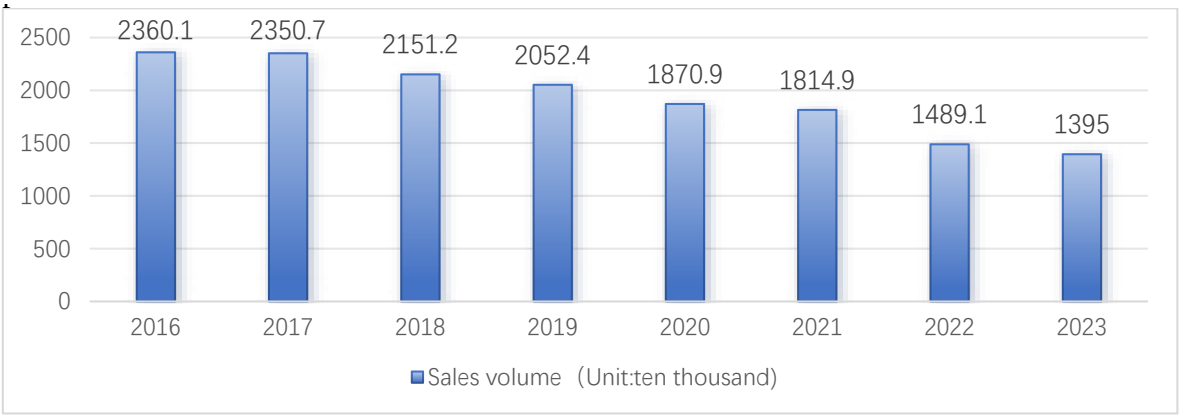


Fig. 5 China Fuel Vehicle Sales (Domestic Terminal), 2016-2023

3. Analysis of traditional fuel automobile industry:

3.1 Market Share Decline

As shown in Fig. 5, since 2016, China's fuel-vehicle sales have been on a general downward trend, falling from 23.601 million units in 2016 to 13.95 million in 2023, and the fuel-vehicle market is shrinking. Consumers' increasing demand for environmental protection and energy efficiency is making traditional fuel vehicles less competitive in the market.

3.2 Pressure for Technological Innovation

In recent years, new energy can be rapid development,

in addition to policy support, another important reason is technological innovation to promote product competitiveness. At present, NEVs in the power, quietness, intelligence and other aspects of the traditional fuel car has been comprehensive beyond, especially plug-in hybrid, set fuel, plug-in, extended range, pure electric function in one. Many traditional automobile companies have transformed to develop NEVs, resulting in the loss of most of the accumulated technological advantages of traditional automobile companies [7]. Fuel car companies are squeezed by new energy, and some companies with tight capital, declining brand power and insufficient product power will find it more difficult to survive. Some joint venture brands are slow to transform and will likely exit the Chinese market in the future.

3.3 Policy Restrictions

Planning for Fuel Vehicle Ban: Although China has not yet announced a unified national timetable for the ban of fuel vehicles, some regions have begun to develop or implement their own plans for the timing of fuel vehicle withdrawal. Double Points Policy, which is an important policy in China to promote the development of NEVs by automakers. It requires automakers to earn points for NEVs while producing and selling fuel vehicles, or else they need to buy points from other companies or face fines. This increases the cost of fuel vehicle production and promotes the production and sale of NEVs. Upgrading of emission standards: Tightening tailpipe emission standards (e.g., upgrading from National V to National VI) have forced automakers to upgrade the clean technology of fuel vehicles, while raising the cost of manufacturing and the threshold for using the vehicles.

Thanks to the large scale, mature supply chain and strong capital of fuel vehicle manufacturers, traditional car companies are accelerating their transition to new energy with the support of national policies [8]. However, the transformation of traditional automobile enterprises is still affected by external factors such as increasing pressure in the domestic market, as well as internal factors such as the rigidity of corporate development orientation and organizational structure. Traditional automobile enterprises are facing both opportunities and challenges, and their market competition situation is worth studying in depth.

4. Comparison and Suggestions

4.1 Comparison

As can be seen in Fig. 6, Fig. 7 and Table. 1, the market share of NEVs is increasing, while that of traditional fuel vehicles is decreasing. From 2005 to 2015, China's NEVs took 10 years, the market penetration rate of more than 1%. 2009, China began to vigorously promote the development of NEV market; 2013, with the joint release of new energy subsidy standards by a number of ministries and commissions, the development of NEVs accelerated under the policy support. China Association of Automobile Manufacturers data show that in 2019, China's cumulative sales of NEVs was 1.206 million, a year-on-year decline of 4.0%, the market share of less than 5%. Since then, with the joining of various new forces and driven by pure electric products, NEVs entered the fast lane after spending a slightly slow 2020. In 2022, NEVs continued to explode in growth, with annual retail sales reaching 5,677,799, up 90.1% year-on-year, with a market share of 27.6%. In addition to the pure electric continuing to maintain a high level of growth, led by hybrid models such as BYD DM-i, plug-in hybrid vehicles were also driven by BYD DM-i and other hybrid models. In addition to the pure electric continue to maintain high growth, driven by hybrid models such as BYD DM-i, plug-in hybrid vehicles promote the role of obvious, the annual cumulative sales of 1,158,000 units, an increase of 1.5 times year-on-year.

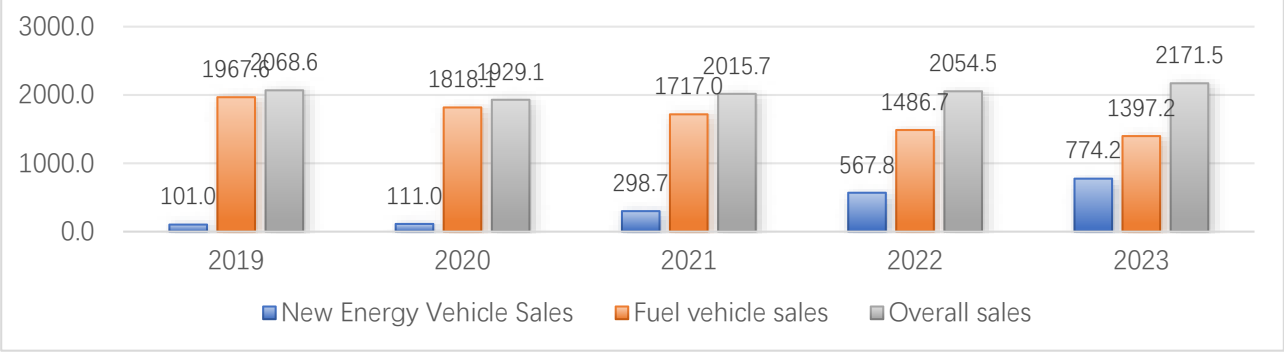


Fig. 6 Annual Retail Sales in New Energy Market and Fuel Vehicle Market, 2019-2023 (Unit: Ten thousand).

Table 1. Annual Retail Sales and Year-on-Year in New Energy Market and Fuel Vehicle Market, 2019-2023

	2019	2020	2021	2022	2023
New Energy Vehicle Sales	1010025	1109554	2986936	5677799	7742464
New Energy Vehicle Market Growth Rate	-0.5%	9.9%	169.2%	90.1%	36.4%
Fuel vehicle sales	19675969	18181338	17169806	14867344	13972065
Fuel Vehicle Market Year-over-Year	-7.9%	-7.6%	-5.6%	-13.4%	-6.0%
Overall sales	20685994	19290892	20156742	20545143	21714529
Overall market year-on-year	-7.5%	-6.7%	4.5%	1.9%	5.7%

Note: New Energy Market: BEV+PHEV; Fuel vehicle market: ICE; Overall market: new energy market + fuel vehicle market

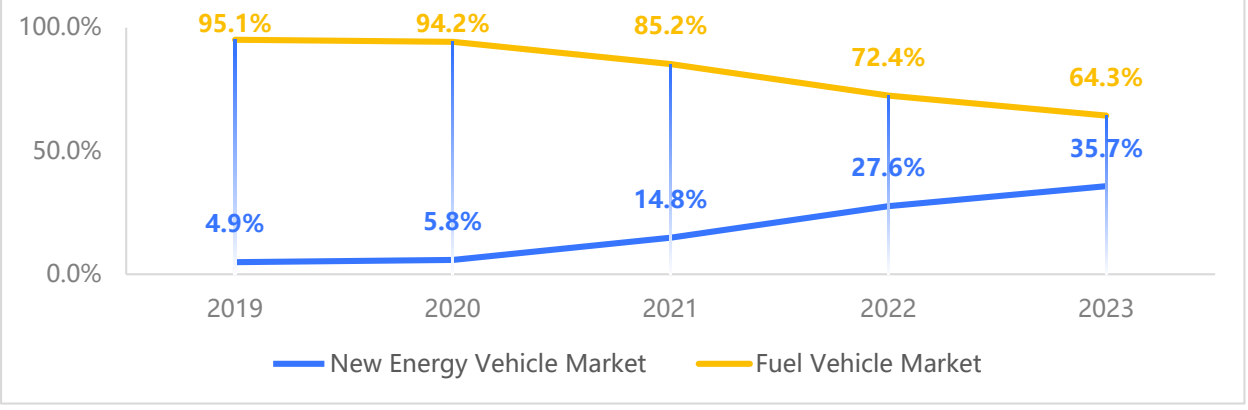


Fig. 7 Annual Retail Sales Penetration Rate of New Energy Vehicle and Fuel Vehicle Markets, 2019-2023. Here, Penetration rate = New energy market/Overall market×100%. The data source is China Automobile Dealers Association Passenger Vehicle Market Information Joint Branch.

In 2023, the kinetic effect of plug-in hybrid vehicles is even more obvious, with annual sales of 2.804 million units, up 84.7% year-on-year, while the overall sales of new energy nearly 9.5 million units, up 37.9% year-on-year, with a market share of 31.6%. China‘s NEV market has risen rapidly, with the penetration rate soaring from 5% to 35% in five years, far exceeding that of fuel vehicles. The output value of China‘s automotive industry has reached RMB 11 trillion, surpassing real estate as the top economic pillar. In April 2024, China Automobile Dealers Association Passenger Vehicle Market Information Joint Branch released the latest data, from April 1 to April 14, the national passenger vehicle market retailed 516,000 units, of which the sales of NEVs increased 32% year-on-year to 260,000 units, with a penetration rate of 50.39%; the national passenger vehicle manufacturers wholesaled 534,000 vehicles, of which 268,000 were NEVs, with a The penetration rate reached 50.19% [5]. The retail and wholesale penetration rates of NEVs both exceeded 50%, which is a milestone event, and traditional fuel vehicles have become a „niche“ choice for the first time.

In the field of NEVs, Chinese brands and new car-making forces are at the forefront of the world, maintaining international leadership in terms of product strength, and continuing to accelerate the replacement of fuel vehicles, leading to a significant increase in market share. Traditional Chinese automobile enterprises represented by BYD and new domestic car-making forces such as „Wei Xiao Li“ have seized the opportunity of the development of new energy passenger cars to form a brand advantage with many new technology applications and high technology configurations, leading the upward development trend of Chinese brands and products [9].

NEVs are developing at an alarming rate, while the market share of fuel vehicles is constantly being eroded, with the market penetration rate decreasing year by year. In particular, the market share of fuel car-based joint venture car companies is shrinking, many traditional car compa-

nies have announced to reduce or stop the research and development of fuel cars, the launch of new products and iteration speed is getting slower and slower, from 59 models in 2020 to 27 models in 2023. 2023 SAIC General Motors sales fell by 14.5%, SAIC Volkswagen fell by 8%, and GAC Honda fell by 13.7%. On the contrary, in the new energy automobile industry, the „reverse“ wave of joint ventures, the face of the new energy automobile field of the rise of Chinese-made car brands, some well-known foreign car companies began to seek to establish cooperation with Chinese brands. This phenomenon of „reverse“ joint ventures further demonstrates that the status of Chinese automobile brands in the global automobile industry continues to improve, and has changed from a follower to a leader.

4.2 Suggestions

For NEVs, it is necessary to further improve the basic supporting facilities, strengthen the tripartite cooperation among the government, car companies and service providers, increase the number of charging piles as well as rationally plan the distribution of charging piles, and solve the problem of parking and charging difficulties for NEVs; accelerate the research and development of core technologies, and the government has increased the subsidized research and development support for NEV enterprises to encourage the technicians of the enterprises to speed up the progress of research and development, and to overcome the cutting-edge areas, and the enterprises should create a Good R&D environment, master the key technology areas, accelerate the investment in the construction of independent brands and high-end brands.

With the implementation of environmental regulations and the continuous development of new energy technologies, fuel vehicles will inevitably need to innovate and improve in order to maintain their competitiveness in the market. The future trend of traditional fuel vehicles will be to deeply integrate with emerging industries in order to realize high-end, intelligent and green transformation [10]. Therefore, the traditional fuel automobile industry chain needs to strengthen the synergistic development with the new energy automobile industry chain, reduce R&D costs, accelerate technological innovation, and cope with market changes; focus on expanding after-sales service to provide consumers with one-stop service, improve customer stickiness, and accumulate loyal users; and strengthen international strategic cooperation and competition to promote the sustainable development of the traditional fuel automobile industry,. Under the background of low carbon economy, traditional fuel automobile industry should actively explore and develop the business model of circular economy and green manufacturing production mode, in order to realize the win-win situation of economic and environmental benefits.

5. Conclusion

At present, the fuel vehicle market share decline, the pressure of technological innovation has intensified, and some automobile enterprises are facing survival challenges, especially those with tight capital, declining brand power and insufficient product competitiveness, as well as joint venture brands that are slow to transform. Meanwhile, although the new energy vehicle industry is developing rapidly, it still needs to solve the problems of profitability, uneven R&D investment, imperfect regulatory mechanism and lagging infrastructure construction. To summarize, China‘s auto industry is in a critical period of transformation, the traditional fuel vehicle industry in the policy restrictions and changes in market demand gradually contraction, while the new energy vehicles in the policy support and technological innovation under the dual drive of rapid growth. In the future, traditional car companies need to accelerate the transformation and upgrading, improve scientific research capabilities, learn from international advanced experience, and build a first-class automotive industry system; the field of new energy vehicles should focus on solving existing problems, optimizing the industrial structure, and perfecting the supporting facilities to ensure sustainable development. Against this background, China is expected to lead the global automobile industry in the direction of green, intelligent and low-carbon, and realize the historic leap from a large automobile country to a strong automobile country.

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