

# *Development "acceleration" and prospect analysis of new energy vehicle industry in Anhui Province*

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**Abstract:** This paper aims to analyze the current situation and future prospects of the development of new energy vehicles in Anhui Province. Through the comprehensive analysis of relevant policy documents, industry data and related research literature, the key factors and trends of NEV development in Anhui Province are revealed. In addition, the support policies issued by Anhui Provincial government in the field of new energy vehicles are sorted out, including subsidies for car purchase, charging infrastructure construction, and support measures for the upstream and downstream of the industrial chain. Then, the current situation of the new energy vehicle industry chain in Anhui Province is sorted out and analyzed, including key technologies, major enterprises, production capacity layout and other aspects. Finally, through the observation and analysis of the global development trend of new energy vehicles, the future prospects of the development of new energy vehicles in Anhui Province are prospected.

## **1. Introduction**

The report to the 20th National Congress of the CPC clearly points out that we must promote the construction of a beautiful China, jointly promote carbon reduction, pollution reduction, green expansion and growth, and promote ecological priority, economy-intensive, green and low-carbon development. We will actively yet prudently promote the process of peaking carbon neutrality. In recent years, with the non-renewable fossil energy, the continuous prosperity of the traditional oil vehicle industry has brought great convenience to people's lives, but also caused energy crisis, environmental pollution and other problems, which to a certain extent also restricted the development of the traditional oil vehicle industry. Therefore, the development of energy saving and environmentally friendly new energy automobile industry has become the best solution for the development of the automobile industry in the world. Vigorously developing the new energy automobile industry is not only conducive to energy conservation and emission reduction, but also to promote the transformation and upgrading of the automobile industry to a certain extent. The report to the 20th National Congress of the CPC clearly points out that we must promote the construction of a beautiful China, jointly promote carbon reduction, pollution reduction, green expansion and growth, and promote ecological priority, economy-intensive, green and low-carbon development. We will actively yet prudently promote the process of peaking carbon neutrality. In

recent years, with the non-renewable fossil energy, the continuous prosperity of the traditional oil vehicle industry has brought great convenience to people's lives, but also caused energy crisis, environmental pollution and other problems, which to a certain extent also restricted the development of the traditional oil vehicle industry. Therefore, the development of energy saving and environmentally friendly new energy automobile industry has become the best solution for the development of the automobile industry in the world. Vigorously developing the new energy automobile industry is not only conducive to energy conservation and emission reduction, but also to promote the transformation and upgrading of the automobile industry to a certain extent[1].

With the acceleration of global industrialization and the increase of car ownership, the emission of traditional fuel vehicles has become one of the main sources of air pollution and greenhouse gas increase. This situation seriously affects the quality of urban environments, exacerbates the rate of climate change and poses a serious threat to human health and ecosystems. As a clean and efficient means of transportation, new energy vehicles have been widely concerned and respected. The development of new energy vehicles can not only reduce exhaust emissions and improve air quality, but also help reduce greenhouse gas emissions and slow down the speed of climate change. Therefore, in-depth research on the development of new energy vehicles, to explore its technology, policy and market issues, has extremely important practical significance and far-reaching impact[2]. In addition, with the continuous progress and innovation of science and technology, the field of new energy vehicles is also facing many challenges and opportunities. For example, the improvement of battery technology, the construction of charging infrastructure, and the development of intelligent transportation systems are all hot areas of current research and exploration. Therefore, through in-depth research on the development of new energy vehicles, we can promote the innovation and progress of related technologies, promote the development of the entire industry chain, and provide more solid support for achieving sustainable development goals.

The purpose of this paper is to deeply explore the current situation, problems and future development trend of new energy vehicles in Anhui province, so as to promote the sustainable development of its industry. This paper analyzes the current situation of the global and domestic new energy vehicle market, researches on technological innovation, analyzes the impact of government policies on the industry, and makes an in-depth analysis of the new energy vehicle industry chain and value chain. Finally, this paper puts forward the future development trend and strategic suggestions to provide theoretical support and practical guidance for the sustainable development of the new energy automobile industry.

## **2. The development status of the global new energy vehicle industry**

In the past decade, the global new energy automobile industry has experienced unprecedented major changes in terms of market pattern, consumer preferences, technical routes, and supply chain systems. Global new energy passenger car sales in the past four years with a compound annual growth rate of more than 60% rapid growth, with the rapid rise of new energy car manufacturing new forces, more new supply chain players have also entered the game, jointly write a new chapter for the rapid development of global new energy vehicles. This once-in-a-century transformation is particularly evident in China. In 2023, China's new energy passenger car sales accounted for 58% of global sales, and Chinese brand sales accounted for 83% of China's passenger car market and 55% of China's high-end passenger car market, further reflecting the outstanding contribution of China's automotive industry in the historic change of the global automotive industry.

## **3. The development status of China's new energy vehicle industry**

According to the statistics of the China Automobile Association, the total production and sales of

new energy vehicles (including commercial vehicles) in 2023 are 9.587 million and 9.495 million, respectively, an increase of 35.8% and 37.9%. The penetration rate of new energy vehicles reached 31.6%, 5.9 percentage points higher than the same period last year; It has been the world's largest new energy vehicle sales country for nine consecutive years, accounting for more than 60% of the total global new energy vehicle sales in 2023. These achievements mark a new stage for China's new energy vehicles to enter the mass market, the industry standards are gradually unified, and the market is gradually mature. By the end of 2023, the number of new energy vehicles in China had reached 20.41 million, accounting for 6% of the total number of vehicles. Among them, there are 15.52 million pure electric vehicles, accounting for 76% of the total number of new energy vehicles.

The automobile industry is a strategic and pillar industry of the national economy and an important force for a new round of scientific and technological revolution and industrial transformation. The development of the new energy automobile industry is the only way for China to move from an automobile power to an automobile power. During the "13th Five-Year Plan" period, the new energy automobile industry has developed rapidly, the vehicle supply capacity has been significantly improved, the spare parts supporting capacity has been gradually enhanced, the level of electrification and intelligence has been improved year by year, the internationalization level has remained in the lead, and the innovation capacity has been steadily improved. Facing the "14th Five-Year Plan", a new round of scientific and technological revolution and industrial change has promoted the automobile industry to accelerate the transformation of electrification, intelligence, networking and sharing. The provincial Party committee and the provincial government of Anhui Province clearly regard new energy vehicles and intelligent networked vehicles as one of the ten emerging industries, and put forward that the output value of the automobile industry exceeds 1 trillion yuan, the production of new energy vehicles accounts for more than 40%, and the construction of an automobile province is strong, and the capital of China's new energy vehicles is built.

#### **4. The development status of the new energy vehicle industry in Anhui Province**

China's new energy vehicle production and sales have accounted for more than 60% of the global market, which marks the rise and leadership of China's new energy vehicle industry. As a major automobile province in China, Anhui Province has also shown strong strength and development potential in this field. In recent years, Anhui Province has taken accelerating the comprehensive development of complete vehicles, parts and after-market as the main line, and accelerated the construction of new energy automobile industry clusters. At present, Anhui Province has gathered Chery Group, Jiangqi, Weilai, Volkswagen Anhui, Hefei BYD and other seven vehicle enterprises, and initially formed a number of auto parts characteristic industrial clusters in Anqing, Xuancheng, Chuzhou, Maanshan and other auto parts, covering the whole industry chain of power batteries, motor electronic control, sales maintenance, recycling and so on. In 2023, the output of new energy vehicles in the province reached 868,000, an increase of 60.5% year-on-year. Behind the figures, it is not only a strong proof of the rapid development of Anhui's new energy automobile industry, but also highlights the new energy vehicles as a key carrier for the development of new quality productivity. In addition, in 2023, the automobile industry was established as the first industry in Anhui. Driven by seven leading vehicle enterprises, Anhui has established a whole industrial chain system with an output value of 1.15 trillion yuan. In Anhui, each city has a supporting industry related to new energy vehicles, and a new energy vehicle can be produced through the "3-hour industrial circle". The development of Anhui new energy automobile industry has today's achievements for the following reasons:

First, strong scientific research and innovation capability, numerous and strong research

platforms. It has universities and institutions with outstanding innovation ability in the automotive field, such as University of Science and Technology of China, Hefei University of Technology, Anhui University, Hefei Institute of Physical Science of Chinese Academy of Sciences, and the Thirty-eighth Research Institute of China Electronics Technology Group, which inject strong impetus into the scientific research and innovation of new energy vehicles, and also train and transport a large number of professional and technical talents for new energy vehicle manufacturing enterprises in the province. In addition, it has established national innovation platforms such as the National Engineering Technology Research Center for energy-saving and Environmental Protection Vehicles, the National Electric Bus System Integration Engineering Technology Research Center, and the National and local Joint Engineering Research Center for Intelligent Transportation, and has set up various large and medium-sized laboratories for electromagnetic compatibility, vehicle power performance, battery systems, electric drive systems, and key components, thus achieving independent research and development of key technologies.

Second, the industrial chain is relatively complete and rich. As one of China's important new energy automobile industry bases, Anhui Province's industrial chain includes multiple links, covering the fields of power batteries, motors, vehicle manufacturing, charging facilities and operation services.

#### **4.1 Power battery and electric core manufacturing**

Anhui Province has some important enterprises and industrial bases in the field of power battery manufacturing. Anhui Province's power battery enterprises actively carry out technology research and development and innovation, and constantly improve product performance and technical level. Through independent research and development and the introduction of international advanced technology, the key indicators such as energy density, safety and life of power batteries have been improved. In addition, the power battery industry chain has gradually improved, covering many links such as cell production, battery module assembly, and battery system integration. At the same time, supporting industries are also gradually developing, such as battery materials, battery production equipment, etc., which provides support for the steady development of the entire industrial chain. The government has introduced a series of policy measures to support the development of the new energy automobile industry, including financial subsidies, tax incentives, industrial fund support, etc., providing a good policy environment and development opportunities for power battery enterprises. With the increasing global attention to clean energy and environmental protection, the market demand for new energy vehicles continues to grow, providing a broad market space and development opportunities for Anhui's power battery industry. It can be seen that the power battery industry in Anhui province is developing rapidly, has good market prospects and development potential, and will continue to play an important role in promoting the upgrading and transformation of the new energy vehicle industry chain.

In addition, in Anhui Province, battery cell production is also a crucial part of the new energy vehicle industry chain. Battery enterprises in Anhui Province continue to increase investment in research and development of core technologies, and continue to improve key performance indicators such as energy density, cycle life, and safety of batteries. By optimizing the material formula, improving the production process and improving the equipment precision, the performance and stability of the battery cell are constantly improved. Enterprises also actively carry out international cooperation and technology introduction, through the introduction of advanced technology and equipment, accelerate the upgrading of the technical level, improve the competitiveness of enterprises and market position. At present, the battery industry chain in Anhui Province has initially formed and is constantly improving. At the same time, supporting industries

are also gradually developing, including cell production equipment manufacturing, cell testing and certification, and battery recycling. With the rapid growth of the new energy vehicle market, the battery industry in Anhui province is facing a huge market demand. At the same time, energy storage equipment, energy storage power stations and other fields have put forward higher requirements for batteries, which has further promoted the development of the battery industry. With the government's increasing policy support for new energy vehicles and energy storage, the battery industry in Anhui province is expected to usher in broader development prospects. At the same time, the expansion of domestic and foreign markets has also provided more development opportunities for battery enterprises in Anhui province. In general, the battery industry in Anhui province, driven by technological innovation, market demand and policy support, is moving towards a more mature and healthy development track, and has made important contributions to the development of the new energy vehicle industry.

#### **4.2 Strong foundation of parts and components industry**

Anhui Province has developed several specialized industrial clusters for automotive components, anchored in cities like Hefei, Chuzhou, Lu'an, and Wuhu. These clusters span the full automotive industry chain, encompassing power batteries, drive motors, key materials, and intelligent connectivity. Enterprises within these clusters have successfully established a well-integrated and robust power battery industry chain, leading to the creation of a diverse drive motor system that includes permanent magnet synchronous and AC asynchronous motors. Furthermore, Anhui Province has amassed a number of leading domestic component manufacturers, including Quanchai Power, Jiefeng Power, Bertelli, Zhongding Group, Guoxuan High Tech, Juyi Power, Tomorrow Hydrogen Energy, and Jiefa Technology, which has significantly enhanced the province's component production capabilities.

#### **4.3 Charging facilities and operational services are relatively well-developed**

For new energy vehicle consumers, the most concerned about the number and location of public charging facilities. Because it is directly related to the convenience of charging electric vehicles[3]. The province has built 140,000 charging piles, pile ratio of 1.24:1. The main urban areas of Hefei, Wuhu and other cities have basically realized a 2-kilometer charging service circle, and the service areas of expressways have been equipped with electric vehicle charging service functions. The construction of public service platforms has been accelerated, and decision-making consulting and data sharing platforms such as charging infrastructure government supervision service platform, remote monitoring and data service center, vehicle networking sharing data center and operation management cloud service platform have been built, which has strongly supported industry information exchange and resource sharing. The development pattern of automobile sales and circulation, maintenance, recycling and reuse of used batteries and other services has been initially formed, and the automobile consumption environment has been further optimized. Anhui Province is actively promoting the testing and demonstration of intelligent vehicles and connected vehicles, accelerating the construction of road network infrastructure. As of now, a total of 57000 5G base stations have been built, which to some extent promotes the construction of urban autonomous driving and smart travel demonstration zones based on 5G. A 4.4km 5G demonstration line for autonomous vehicles has been officially opened.

#### **4.4 Strengthen R&D and innovation**

Anhui Province has implemented the New Energy Vehicle and Intelligent Connected Vehicle

Industry Technology Innovation Project and a series of provincial-level major industrial innovation plans, organized leading enterprises and universities to form innovation consortia, and further guided enterprises to carry out technological breakthroughs in the fields of power batteries, automotive chips, autonomous driving, etc. These measures will help to ultimately achieve industrialization.

At present, the new energy automobile industry in Anhui Province has formed a certain scale, covering vehicle manufacturing, parts manufacturing, charging equipment and other fields, and the industrial scale is also expanding. In terms of technology research and development and innovation, Anhui Province has made certain progress in new energy vehicles. Many companies have conducted in-depth research in key areas such as battery technology, electric drive technology, and intelligent interconnection, and have achieved a series of innovative results. In terms of policy support and market demand, the government's policy support is an important driving force for the development of new energy automobile industry in Anhui Province. A series of policy documents and planning documents have been issued, providing new energy vehicle enterprises with policy support in terms of financial subsidies, tax incentives, research and development funding support, and stimulating the innovation vitality of enterprises. At the same time, with the increasing attention of society to environmental protection and energy saving, the market demand for new energy vehicles is also gradually increasing, and the market potential is huge. In terms of battery technology and energy management, Anhui new energy vehicle enterprises have conducted a series of studies and practices in this regard. Many companies are committed to improving the energy density, cycle life and safety performance of batteries, using new materials and advanced processes, and achieving certain technological breakthroughs. At the same time, the intelligent energy management system is also gradually applied to new energy vehicles[4], effectively improving energy efficiency and driving experience. In terms of charging infrastructure construction, charging infrastructure construction is an important guarantee for the development of new energy vehicles in Anhui province. In recent years, Anhui Province has intensified the construction of charging infrastructure and constantly improved the layout and coverage of charging stations and charging piles. At the same time, the government also encourages enterprises and social capital to participate in the construction of charging infrastructure, speeding up the construction process of charging networks.

## **5. Challenges to the development of new energy automobile industry in Anhui Province**

The new energy vehicle industry in Anhui Province is facing a series of challenges in its rapid development process, which involve many aspects such as technology, market, policy and capital.

First of all, technological challenges are the key to industrial development. Continuous technological innovation is the cornerstone to ensure competitive advantage in the new energy vehicle market. As an emerging technology industry, the new energy vehicle industry needs to break through the technological path dependence on the basis of the traditional internal combustion vehicle development mode. Traditional internal combustion engine vehicles have been evolving since their introduction. Continuous technology research and development and improvement, including improvement of engine efficiency, enhancement of vehicle safety, strengthening of emission standards, etc. However, with the increasing importance of environmental protection and sustainable development, as well as the rapid development of new energy vehicle technology, oil trucks are facing more and more challenges. Nevertheless, oil trucks still have their value and demand for existence in specific markets and applications. Especially in some regions, under the influence of factors such as insufficient construction of new energy infrastructure, high familiarity of users with traditional vehicles, and cost factors, oil trucks are still the mainstream choice.

Therefore, it is necessary to consider the transformation and layout to the field of new energy vehicles to adapt to the future market demand and development trend. Enterprises should increase investment in research and development[5], focusing on key areas such as battery technology, motor performance, energy management system and intelligent driving, so as to achieve higher driving range, stronger power performance and lower carbon emissions, improve battery energy density and prolong cycle life. Associated enterprises fulfill consumer demands for performance, safety, and convenience by enhancing product intelligence and interconnectivity.

Secondly, market challenges are also important obstacles to industrial development. The new energy vehicle market is highly competitive, and consumers are highly concerned about factors such as price, driving range and charging facilities. Such technological research and development not only enhances product competitiveness, but also meets consumers' demand for green environmental protection and high technology. Secondly, accurate marketing strategies are crucial to enhance brand influence and market share. Enterprises need to conduct in-depth research on consumer needs, determine the target market, and carry out brand building through multi-channel marketing strategies. All these will help new energy vehicle enterprises to stand out in the highly competitive market. In addition, strengthening the coordination and cooperation of the industrial chain can further enhance the competitive advantage of the new energy vehicle market. Enterprises should establish close collaborative relationships with suppliers, manufacturers, technology research and development institutions and other partners to achieve resource sharing, technology communication and supply chain optimization. Through cooperation and collaboration, enterprises can reduce costs, improve efficiency, and form a strong competitive force in the market.

The imperfect after-sales service system is also an important factor affecting the difficulty of new energy vehicles to break through the siege. Establishing a sound after-sales service system is also an important part of ensuring competitive advantage. Good after-sales service can not only enhance consumers' trust and loyalty to the brand, but also solve the problems encountered by users in the process of use, provide timely repair and maintenance support, and enhance the brand image. In addition, new energy vehicle enterprises should also pay attention to the quality and efficiency of after-sales service, strengthen the construction and management of after-sales service network, and ensure that consumers can enjoy a full range of high-quality service experience after purchase. The company has integrated the concept of sustainable development into its corporate strategy and actively promoted sustainable development initiatives such as green production, recycling resources and reducing carbon emissions. This is not only in line with social responsibility, but also helps to enhance the corporate image and gain support from the government and consumers. Finally, strengthening international cooperation and exchanges is also one of the important ways for new energy automobile enterprises to maintain their competitive advantages. Through cooperation with internationally renowned enterprises, research institutions and industry organizations, advanced technology and management experience can be shared, markets and channels can be expanded, and global market competition and challenges can be jointly met. At the same time, strengthening international exchanges also helps to enhance the international influence and competitiveness of enterprises and promote the international development of the new energy vehicle industry.

Consumers' awareness and acceptance of new energy vehicles still need to be improved, and the market promotion faces certain difficulties[6]. An important factor that has not been effectively promoted in today's new energy vehicles is "range anxiety"[7], so on the basis of continuous research and development of battery technology, vigorously promoting charging infrastructure is another way to develop new energy vehicles, including charging piles, charging stations, exchange stations, etc. With the rapid growth of the new energy vehicle market, the demand for charging infrastructure is also increasing. However, the construction of charging infrastructure needs to invest a lot of capital and human resources, involving site selection, facility construction, power

supply and other aspects; therefore, the construction speed of charging infrastructure is often difficult to meet the rapidly growing demand of the new energy vehicle market[8].

Thirdly, government subsidy policies, technical standards, charging infrastructure construction and other policies will directly affect the direction and speed of industrial development. The government can create a favorable development environment for new energy vehicle enterprises by providing financial subsidies, tax incentives, research and development funds, infrastructure construction and other ways. These policy measures should be aimed at stimulating technological innovation, promoting market expansion, and facilitating consumers' purchase of new energy vehicles. The adjustment of subsidy policies for the new energy vehicle industry is a major change in the development of China's new energy vehicle industry. This policy shift will have a broad and far-reaching impact on the ecology of the new energy vehicle industry. First of all, the decline of subsidies may lead to the slowdown of the overall sales growth of new energy vehicles, especially the market bubble formed under the policy stimulus may gradually fade away, avoiding excessive competition and resource waste caused by subsidies to a certain extent[9]. At the same time, the new-energy vehicle industry's long-term dependence on subsidies will continue to weaken its own independent research and development capabilities, making it path dependent, and ultimately difficult to achieve key technological innovation, affecting the long-term healthy development of the industry. At the same time, the subsidy retreat also alleviates the price distortion in the automobile market under the subsidy state. This also makes the investment of relevant enterprises in new technology research and development may be limited, affecting the introduction and application of new technologies and challenging China's leading position in the field of new energy vehicle technology. However, the protection of any industry in the early stage of its establishment is for better growth, but this protection policy is not permanent, otherwise it will not be able to push it into the melting pot of the international market. In this process, industrial chain links such as supply chain and sales channel can be readjust to adapt to the new pattern brought by policy changes. In addition, the fierce market competition may accelerate the merger and reorganization among enterprises, further shaping the market pattern. Finally, policy adjustment will also test the coordination mechanism between the government and enterprises, and how to maintain market stability in the policy change has become a common challenge faced by the government and enterprises. Therefore, the adjustment of the subsidy policy for the new energy vehicle industry is not only a policy change, but also a profound adjustment of the industrial ecology and market pattern, which requires the joint efforts of the government and enterprises. Industries need to adapt to the impact of policy adjustments and flexibly adjust their development strategies.

Finally, financial challenges are also an important factor restricting industrial development. The development of new energy vehicles faces multi-dimensional financial challenges, involving technology research and development, production facility construction, marketing, charging infrastructure, policy support and supporting investment in the upstream and downstream of the industrial chain. The technology research and development stage requires huge investment to promote innovation and breakthrough in key fields such as battery technology and motor technology. In terms of the construction of production facilities, including the construction and maintenance of infrastructure such as production lines and charging facilities, a large amount of financial support is required. In the stage of marketing and sales, capital investment such as advertising and sales network construction is needed to expand market share and enhance brand awareness. The construction of charging infrastructure is also the key to the development of new energy vehicles, which requires the government and enterprises to jointly invest funds to solve the problem of insufficient charging piles. Policy support and subsidies are important means to promote the rapid development of the new energy vehicle industry, and the government encourages enterprises and consumers to purchase new energy vehicles through tax cuts and subsidies. At the



same time, supporting investment upstream and downstream of the industrial chain also needs financial support, including the production and research and development of key components such as batteries and motors. Therefore, to solve the financial problems faced by the development of new energy vehicles, the government, enterprises and financial institutions need to work together to establish a sound policy system and financial support mechanism, attract more capital to invest in the new energy vehicle industry, and promote the healthy and sustainable development of the industry[10]. At the same time, enterprises also need to strengthen their own capital management ability, improve profitability and capital utilization efficiency, so as to ensure the effective use of funds and the sustainable development of the industry.

## 6. Conclusion

The new energy vehicle industry in Anhui Province is developing rapidly with a vigorous situation, and presents the characteristics of multi-level and multi-field development. Its industrial chain has been gradually improved, covering many links from vehicle manufacturing to battery technology, intelligent drive system, charging equipment and so on, forming a relatively complete industrial ecosystem. Technological innovation plays a crucial role in driving industrial development, and enterprises continue to increase investment in research and development, focusing on improving battery energy density, cycle life and safety performance, in response to increasingly stringent environmental protection standards and consumer demand for high-performance and intelligent products. At the same time, the government's policy support also provides an important guarantee for industrial development. Financial subsidies, tax incentives and other policies and measures stabilize the enterprise development environment and provide financial support. With the acceleration of the construction of charging infrastructure and the improvement of the level of intelligence, the new energy vehicle industry in Anhui Province will further enhance the technological level, accelerate the industrial upgrading, and inject new impetus into the high-quality development of regional economy.

In general, although the new energy vehicle industry in Anhui Province develops rapidly, it faces many challenges. Through the implementation of comprehensive measures such as technological innovation, market development, policy support and financial guarantee, the industry will be able to gradually overcome these challenges and achieve the goal of sustainable and high-quality development.

Anhui Province, as one of the important development bases of China's new energy vehicle industry, is committed to promoting the development of the new energy vehicle industry to the direction of intelligence and green. With the support of government policies, Anhui Province has established a sound industrial chain system, covering the R&D, production, sales and charging infrastructure construction of new energy vehicles. In the future, Anhui Province will continue to increase its support for the new energy vehicle industry, strengthen technological innovation and talent training, enhance the competitiveness of enterprises, and help the new energy vehicle industry to move towards a more prosperous and sustainable development.

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