

A New Machine to Change the World? The Rise of China's New Energy Vehicle Industry and its Global Implications

Against the backdrop of an increasingly complex international environment as well as growing concerns over environmental protection and energy security, the development of new energy vehicles (NEVs), particularly in China, has become a global focal point.¹ Since 2016, China has consistently ranked first in the world in annual sales and ownership of NEVs. In 2023, China's NEV sector experienced explosive growth, with production and sales reaching 9.587 million and 9.495 million units, respectively; China's NEV sales accounted for 66% of the global total. Additionally, in 2023, China surpassed Japan to become the world's largest automobile exporter, a historic achievement closely linked to the rapid overseas expansion of its NEV industry. According to the China Passenger Car Association (CPCA), China exported 1.73 million NEVs in 2023, representing over 30% of its total automobile exports. Furthermore, the quality of China's NEV exports has been steadily improving, with export prices rising and nearly half of the exports destined for European countries such as Germany, France, the United Kingdom, and Belgium. This marks a shift from China's traditional focus on developing countries as its primary export markets.

Conversely, the United States government announced a policy in February 2024 to restrict the entry of Chinese NEVs into the US market. The Alliance for American Manufacturing (AAM) has urged the Biden administration to take measures to prevent Chinese automotive and industrial products from effectively entering the US market through investments in Mexico. Almost simultaneously, after a decade of research and development costing billions of dollars, Apple announced it was abandoning its NEV project. European countries and their automotive companies, once engaged in a public relations race to announce timelines for phasing out gasoline vehicles and spearheading the implementation of carbon tariffs, have indicated shifts in their stance. For instance, at the end of February 2024, Mercedes-Benz announced that it was delaying its goal to become an electric vehicle-only brand by 2030 and that it planned to continue producing internal combustion engine vehicles well into the next decade. Given these developments, what will the international landscape of the NEV and automotive industry look like in the near future?

The automotive industry has a significant pull effect on various sectors, which prompted the renowned management scholar Peter Drucker to dub it 'an industry of industries' in the mid-twentieth century. In 1990, three professors from the Massachusetts Institute of Technology went further, calling automobiles 'the machine that changed the world'.² Today, few would doubt the importance of NEVs in international competition, as they are poised to become *the new machines that change the world* in the twenty-first century. Over the next ten to twenty years, NEVs will not only serve as key application platforms for technologies like semiconductor chips, cloud computing, artificial intelligence, and satellite communication, but also be closely linked to the development of smart transportation systems, smart grids, and smart cities. Whether driven by the ambition to dominate competition in cutting-edge technologies or by goals of economic stability and job

security, no developed country can afford to be excluded from the NEV industry competition. This implies that competition between China and Western developed countries over NEVs will persist for a considerable period, encompassing technology, products, policy, strategy, and geopolitics.

In reality, the rise and overseas expansion of China's NEV industry is not an upstart force 'invading' the space occupied by traditional automotive powerhouses, as portrayed by some on Chinese social media. This can be seen from both local and global perspectives. Domestically, the growth of China's NEV industry has benefited from the innovation of the country's traditional automotive industry, a lengthy and arduous capacity-building process rather than the result of quick fixes or shortcuts. Internationally, since China began to pursue 'market access in exchange for technology' economic strategies in the 1980s, traditional automotive powerhouses from developed countries have included Chinese manufacturing and the Chinese market in their global plans, reaping significant profits in the decades since from their deep involvement in the Chinese market. Thus, Chinese automobiles are neither new nor sudden entrants into the global market that emerged outside the purview of developed countries. Over the past twenty to thirty years, China's automotive industry has risen from very unfavourable initial circumstances through independent innovation, breaking through the frameworks set by Western countries and leveraging the NEV opportunity window to achieve massive growth, something never foreseen in the plans of traditional multinational corporations.

Globally, the rise of Chinese NEVs is not the first challenge faced by traditional automotive powerhouses in the post-World War II period. Viewing the rise of China's automotive industry as the latest new player's impact on the global automotive landscape, it becomes evident that the fundamental issues of traditional automotive powerhouses lie within. Consequently, competition and trade disputes over NEVs are bound to intensify in the foreseeable future, presenting new challenges for China.

The 'World War' in the Traditional Automotive Industry

Due to the special importance of automobiles in the modern industrial economy, every historical shift in dominance and competitive advantage within the automotive industry has been determined by more than mere internal technological and product competition. Instead, these shifts have been accompanied by intense trade wars among major countries.

After the birth of the automotive industry in the nineteenth century, the United States became the first country to gain dominance, in the early twentieth century, by creating large-scale assembly line production systems. By 1950, the US accounted for a staggering 80% of global automobile production.³ From the 1960s, Germany, Japan, and South Korea successively challenged the United States. The first challenge came from Germany's Volkswagen with its low-priced models. By 1970, the number of passenger vehicles imported by the US from Germany accounted for about 10% of domestic passenger vehicle sales. The subsequent challenge from Japan was even more formidable. In 1980, the US imported 1.89 million passenger vehicles from Japan, accounting for 21% of its domestic sales. That same year, Japan topped the global automobile production list for the first time with a total output of 11.04 million vehicles. During the 1980s, yet another new 'invader' emerged in the form of South Korea's Hyundai, with Korean passenger cars making up nearly 5% of the US market share by 1987.

The rise of challengers from Germany, Japan, and South Korea was supported by new design concepts, manufacturing technologies, and production organisation methods, the most notable being Japan's lean

production system. Led by Toyota, Japanese companies emphasised compact and fuel-efficient designs and empowered frontline workers with control over the production line to enhance manufacturing efficiency and quality. In terms of collaboration between assembly plants and parts suppliers, Japanese companies developed a Kanban production system, ensuring just-in-time supply and greatly reducing inventory pressures. For product development, Toyota involved its cooperative suppliers in the design and improvement processes from the outset, unlike US suppliers, who only produced according to the technical parameters and quantities specified by the main manufacturers.

These challenges had a significant impact on the United States. In 1978, over one million workers were employed in the US automotive manufacturing industry, but two years later, employment had dropped by 22%.⁴ To counter these challenges, the US government not only provided substantial policy subsidies and loans domestically but also took a series of retaliatory actions internationally. In 1981, the US and Japan signed a voluntary export restraint agreement, capping Japan's annual export volume to the US at 1.68 million vehicles for the next three years, with a limit of 1.85 million vehicles for 1984. Japan quickly adapted: on the one hand, Japanese companies maintained profit margins by exporting higher-priced products; on the other hand, from 1982 onwards, Japanese automakers began setting up factories in the US and Canada. By 1986, the eight major Japanese automakers had a combined annual production capacity of about 2.4 million vehicles in the US, accounting for more than 20% of the US's annual new car production.⁵ Even though the 'Big Three' US automakers collectively invested \$125 billion between 1988 and the mid-1990s in factory renovations and new product development, while also closing old factories and downsizing staff and operations, their domestic market share continued to decline, falling from 72% in 1995 to 59% in 2005.⁶

In response to the rapid expansion of Japanese production capacity in the US, the US government further escalated its restrictions. On the one hand, the US initiated Market-Oriented Sector-Selective (MOSS) talks with Japan, and in 1986, using MOSS, demanded that Japan relax restrictions on US automotive and parts companies entering the Japanese market. On the other hand, as Japanese companies established factories in the US, friction in auto parts trade between the two countries intensified. In 1993, the US government demanded that the Japanese government make specific commitments regarding the quantity and growth rate of US-made auto parts purchased by Japanese firms. When negotiations broke down, the US launched a 'Super 301' trade investigation against Japan and imposed punitive tariffs.⁷ As trade frictions intensified, the Japanese yen appreciated against the US dollar following the 1985 Plaza Accord, production costs in Japan rose, and Japanese automakers' competitive advantage in the market began to decline gradually from the late 1990s.

The automotive wars from the 1960s to the 1990s profoundly altered the global landscape of the industry. After adjusting their strategies, multinational companies sparked a worldwide wave of mergers, acquisitions, and the formation of technical alliances in the automotive industry. This shift transformed automotive industry competition from being primarily national or regional to being truly global. Major automotive companies focused on developing several global product platforms, which allowed them to create a diverse range of models to meet the varying needs of different countries, balance market demand fluctuations across regions, and achieve economies of scale in product development and parts procurement. From the 1990s onward, large automotive manufacturers began divesting from non-core businesses while accelerating investments in manufacturing plants based in developing countries, aiming to leverage lower labour costs and fully tap into local markets. As the automotive wars drew to a close, the scale of the global automotive

industry reached unprecedented levels, growing from 33.4 million units in 1971 to 58.95 million units in 2000. This expansion led to severe overcapacity, with global excess automotive production capacity reaching 20 million units in the early twenty-first century, equivalent to the entire capacity of Western European countries.⁸ Some automotive brands or companies did not survive the wars. British automotive brands experienced the most severe wave of acquisitions. Rolls-Royce, Bentley, Jaguar, Aston Martin, Lotus, and Rover were all acquired, with some brands changing hands multiple times. As a result, the UK no longer had a major car manufacturer capable of large-scale production under its control.

However, developed countries with automotive industries do not view automotive industrial development purely from an economic rationality perspective due to the industry's strong employment-driving effect. Each assembly plant typically employs 5,000 workers and indirectly supports 20,000 jobs in the parts supply sector. In the mid-twentieth century, when the US automotive industry was thriving, and Detroit was still the centre of the automotive world, one in six people in the country was directly or indirectly employed by the automotive industry.⁹ Thus, even in the face of severe overcapacity, reducing production and laying off workers in the automotive sector remains politically challenging. In 2022, Japan's automotive-related workforce reached 5.54 million people, accounting for 8.2% of total employment.¹⁰ In 2021, the European Union's automotive-related workforce was 12.9 million people, making up 6.8% of total employment. In 2022, in the US, the number of people working in automotive manufacturing, wholesale and retail, and aftermarket services was 7.39 million, amounting to about 5% of total employment.¹¹ This makes competition in the automotive industry not just a battle for market share among companies but also a political-economic contest among nations.

The traditional automotive 'world wars' have left a series of aftershocks that continue to influence new automotive industry competition in the twenty-first century. This is first reflected in Japan's misstep in energy-saving and NEV technologies. Since the mid-1990s, Japan invested heavily in traditional hybrid and hydrogen technologies to secure a technological edge, achieving significant results. However, mainstream European and US companies were slow to follow Japan's lead, not only due to strategic predictions at the technical level but also as a tactical move to resist Japanese competitive advantages.

Another unexpected aftershock is the development of the Chinese automotive industry. On the one hand, traditional automotive giants took advantage of the Chinese government's 'market for technology' policy, integrating China's automotive industry and market into their systems to gain larger market scales to spread costs or to profit by selling mature or older generation product blueprints and machinery. Before China joined the World Trade Organisation in 2001, more than ten leading multinational companies had already established over twenty joint ventures in China. After 2001, all major multinational automakers targeting the mass market utilised the 'market for technology' policy to enter China. These joint ventures deliberately suppressed the technological innovation of their Chinese partners, focusing resources on localising the production of introduced models.

On the other hand, the traditional automotive 'world wars' also created conditions for the rise of innovative Chinese automotive companies. Due to widespread over-investment and lack of growth by multinational giants, many specialised technology companies began to break away from whole vehicle manufacturers to seek better survival opportunities through external markets. Some design and engineering companies, originally serving mainstream car manufacturers, started to look for opportunities in emerging markets. Renowned

Italian design firms such as Pininfarina, Bertone, and Italdesign played significant roles in the early stages of technological capability development for innovative Chinese automakers like Hafei, Chery, Geely, and Great Wall. Similarly, engineering companies like Lotus, Ricardo, AVL, FEV, and Mitsubishi focused on selling engineering and technical services to Chinese innovators.

When China's development policy shifted towards 'independent' or 'indigenous' innovation in 2005, automotive companies that had fallen short in the previous 'world wars' became targets for acquisition by Chinese firms. This strategy helped Chinese companies, especially traditional state-owned enterprises, to accelerate their acquisition of vehicle technologies and access international markets, though the outcomes varied significantly across different cases. For instance, SAIC's acquisition of Korea's SsangYong was unsuccessful, but later, SAIC and Nanjing Automobile's acquisition of some assets of the UK's Rover were eventually integrated into SAIC's MG brand. Meanwhile, BAIC acquired part of Saab's technological blueprints, and leading Chinese innovator Geely successfully acquired Volvo with state support and later acquired stakes in Lotus and Smart brands.

Transformations and Breakthroughs in the New Energy Vehicle Industry

In the twenty-first century, a new wave of automotive 'world wars' has been gradually brewing around the field of NEVs. Efforts to industrialise NEVs originated during the tail end of the automotive wars of the previous century. Triggered by the oil crisis and an increasing societal demand for environmental protection and fuel efficiency, major industrial nations began developing NEV projects. As power battery technology has advanced, new companies have emerged (like Tesla since 2003), and environmental concerns have grown more prominent in sociopolitical life, NEVs have increasingly become the clear direction for future development.

Although China was a latecomer to the NEV sector compared to Japan and the United States, it was the first country to explicitly outline a direction for NEV development at a national strategic level and achieve fundamental breakthroughs in large-scale industrial applications. As part of the tenth Five-Year Plan (2001–2005), China established major projects for electric vehicles in its national high-tech research and development program, or '863 Program', and set up a specific 'three verticals and three horizontals' research framework.¹² In 2010, China's State Council designated NEVs as one of the seven strategic emerging industries, and in 2012, it released the Energy-Saving and New Energy Vehicle Industry Development Plan (2012–2020), which clearly defined the strategy for pure electric drive technology. Although China has long been in a state of rapid catch-up in developing key core technologies, a series of factors enabled it to achieve significant progress in the industrialisation of NEVs, including advancements in power battery safety, power battery structure, and electric vehicle chassis platforms.

First, the development of China's traditional automotive industry laid a solid foundation for its NEV industry. The rise of independent innovation companies such as Chery and Geely in the late 1990s spurred intense competition in scale and product innovation within the domestic automotive industry. By 2009, China had become the world's largest producer and seller of automobiles, with production and sales approaching 13.8 million and 13.65 million units, respectively. Not only did this process directly give birth to a number of important domestic firms in the NEV field, it also laid a solid foundation for the establishment of a robust industrial chain for China's automotive industry. Moreover, due to the enduring reputation and cultural influence of foreign brands in the traditional fuel vehicle market, Chinese independent brands

struggled to shake off the perception of making ‘cheap small cars’ prior to 2010. Many attempts to enter the larger B-class and higher-priced ‘premium’ car segments were unsuccessful. This positioning challenge motivated Chinese automotive companies that were pursuing independent innovation to have a stronger drive for transformation when faced with new industrial opportunities in the transition from traditional fuel to electric vehicles.

Second, the Chinese government has consistently implemented policies to promote the development of strategic emerging industries. From 2009 onwards, initiatives such as the ‘Ten Cities, A Thousand Vehicles’ NEV demonstration and promotion project and other pilot projects began to be rolled out. Despite some early setbacks, the goal of having 500,000 NEVs in operation was essentially achieved by 2015. More importantly, during this period, with strong central government support and active participation from local governments, the domestic NEV supply chain gradually took shape. Between 2010 and 2020, the central government provided over 150 billion Chinese renminbi (RMB) in subsidies for NEV purchases (commonly known as ‘national subsidies’), attracting industry participants in the early stages of development. Most of today’s active domestic parts suppliers in the NEV sector were established during this time. From late 2015, numerous intelligent connected vehicle (ICV) testing and demonstration zones began to emerge across the country. Local governments in Shanghai, Chongqing, Beijing, Zhejiang, Changchun, Wuhan, and Wuxi actively collaborated with China’s Ministry of Industry and Information Technology (MIIT) to promote testing and verification on semi-closed and open roads. By the end of 2020, the construction of pilot cities for ‘Dual Intelligence’ (intelligent transportation and smart cities) was gradually rolled out. In November 2023, the MIIT announced the opening of road tests for level 3 and level 4 autonomous driving, marking a new milestone for China’s ICV industry and officially entering the mass production and application phase.¹³

Third, continued reforms by the Chinese government have mobilised market forces, especially since 2015, when a series of institutional reforms and adjustments created space for new entrants in the automotive industry. On the one hand, a clear subsidy phase-out scheme and the ‘dual-credit’ policy forced companies to focus more on investing in technological research and development, and improving manufacturing scale and quality to gain market share.¹⁴ Simultaneously, the government continued to implement favourable policies such as purchase tax reductions and exemptions and infrastructure construction incentives. On the other hand, the entry of Tesla into the Chinese market not only created a ‘catfish effect’, spurring innovation and improvements among ‘weaker’ competitors, but also encouraged capital from the internet and high-tech industries to enter the field. Additionally, the government adopted a relatively lenient attitude towards new automotive players, allowing for various flexible measures such as contract manufacturing and purchasing certifications. The entry of these new players brought fresh ideas and technologies, and the integration of internet and artificial intelligence technologies led to rapid development in the fields of intelligent cockpits and smart driving in China. These new companies also introduced innovative business models, adeptly capturing changes in market demand, and focusing on continuous technological upgrades to extend the value chain for users. This shift transformed traditional business models from ‘manufacturing’ to ‘manufacturing plus service’, with much of the product value stemming from post-delivery services and upgrades, thereby creating new strength for China’s NEV industry.

These factors have enabled China to achieve large-scale industrialisation in the NEV and power battery industries ahead of others. In 2015, the market penetration rate of NEVs in China was just over 1%; by 2022, it had reached 25.6%, meaning that China achieved the 20% target that it had set for 2025 three years ahead of the schedule. China has also produced globally competitive NEV manufacturers. For instance, in 2022, the

Chinese firm BYD surpassed Tesla to become the world's top seller of NEVs, and in 2023, it broke into the top ten in global car sales with an annual volume of 3.02 million units. More importantly, China has preliminarily established an NEV industry system with a self-sufficient and controllable supply chain, without any chokepoints in the supply of critical components that could be constrained by other countries. Notably, China's promotion of NEVs has led them to penetrate deeply into the vast markets of the country's third- and fourth-tier cities and rural areas. According to data from the China Association of Automobile Manufacturers, since the Chinese government began promoting NEVs in rural areas in July 2020, total sales of rural NEV models reached 4.12 million units by the end of 2022. This indicates that even after multiple rounds of subsidy phase-outs and the complete cancellation of national subsidies starting in 2023, the overall market has continued to experience rapid growth.¹⁵ It can be said that market mechanisms have successfully taken the baton and become the most crucial driving force for China's NEV industry.

In fact, the rise of China's NEV industry broke through a prolonged impasse, in which domestic brands were unable to surpass a 45% market share in the country's automobile market. Various data indicate that the market share of domestic brands in China reached approximately 55% in 2023. After 2020, not only did the sales market share of German, Japanese, and Korean brands show a significant downward trend in China's automobile market, but their absolute sales levels also declined.

During this period, with breakthroughs in key NEV technologies, various countries have successively formulated national-level electric vehicle transition strategies. In 2018, the UK Department for Transport issued its Road to Zero strategy, a policy document that set out a phased timetable for the full electrification of vehicles, proposing to end the sale of traditional fuel vehicles by 2040. A few years later, in 2021, the Japanese government released its Green Growth Strategy, aiming for all new car sales to be electric vehicles by 2035. That same year, the EU proposed an amendment to CO₂ emission standards for light-duty vehicles, stipulating that all new light-duty vehicles sold must achieve zero emissions by 2035. Finally, the United States also clearly stated in 2021 that NEVs should account for 50% of new car sales by 2030.

However, in contrast to these ambitious governmental declarations, traditional automobile enterprises in Europe, the United States, Japan, and South Korea have found the transition process to be slow and challenging. There are several key reasons for this difficulty. First, these countries and regions generally face resistance from large interest groups related to the petrochemical industry. Conflicts between multinational corporations and labour and social groups can also impede the transition to new energy. For example, in September 2023, the United Auto Workers in the United States launched a strike against the three major automobile giants simultaneously for the first time in history. Along with aiming to secure wage increases and other benefits in a new round of labour negotiations, the strike fundamentally reflected workers' concerns and dissatisfaction with the new energy transition and their demand for a 'just transition' rather than one dictated by corporations.

Second, traditional automotive giants find it difficult to transform their strategic thinking and planning. The technical architecture of traditional cars is centred around mechanical power systems, whereas NEV designs focus on batteries, software, sensors, and intelligent computing. This shift is prominently reflected in the differences between the electronic systems of traditional and new energy vehicles. In traditional cars, electronic systems serve to assist mechanical and electrical systems in performing their functions, whereas NEVs, in addition to having traditional mechanical control chips, also incorporate chips related to smart cockpits and intelligent driving. These smart chips need to communicate in real time with various control

chips, becoming the neural network that dominates the entire product system. In terms of hardware, the number of chips in NEVs is increasing, including consumer-grade computational chips that were previously absent. Conceptually, this electronic system defines the fundamental logic of NEV design, manufacturing, and control. It is also evolving, currently transitioning from distributed control to domain control, and it may further develop into centralised computing control by a few chips in the future to improve communication efficiency and reduce costs. This architecture provides expandability and upgradability, allowing smart vehicles to adapt to different user habits and to update their functions as software technology evolves, posing a significant challenge to traditional enterprises' design and development approaches.

Third, the transformation difficulties of traditional enterprises are also reflected in their path dependency within and between organisations. Throughout their long-term engagement in the automotive industry, these firms have established structured institutional arrangements for internal and external collaboration. When faced with technological challenges that necessitate transformation, the internal departments of traditional enterprises may easily encounter conflicts over strategic decision-making power and resource allocation priorities, making it difficult to quickly adjust organisational structures and smoothly advance the development and industrialisation of emerging technologies. In the past, some multinational enterprises have even developed highly promising products, but the success of these products and technologies have been buried amid internal organisational struggles during crises.

For these large multinational enterprises, a considerable amount of NEV development may need to be transferred to China. Traditionally, multinational companies have primarily developed new products at their headquarters and then introduced them to other markets around the world (with possible adjustments according to specific market characteristics). However, China has become a leading market in the NEV industry, necessitating a thorough understanding of China's technological frontiers and potential consumer demand changes to better complete developmental work. Additionally, operating in China can help them avoid various bureaucratic hurdles that exist in their head offices. More importantly, the automotive revolution brought about by NEVs is not occurring in isolation but is intertwined with revolutions in energy, transportation, and information technology. NEVs can absorb a wide array of new technologies from a range of sectors, including information technology, networking, artificial intelligence, big data, cloud computing, new materials, power electronics, and advanced manufacturing, thereby becoming a platform for integration and innovation in numerous industries. For example, NEVs need to integrate with the information technology industry to achieve information interconnectivity between vehicles and cities, roads, and charging facilities. This requires developers to participate in innovation ecosystems closely related to cutting-edge technologies such as 5G, big data, artificial intelligence, smart grids, and smart cities. However, such complex and advanced innovation ecosystems are mainly flourishing in China and a few other countries and regions, which undoubtedly increases the difficulty for multinational giants to develop technologies and products based on their headquarter markets.

The 'rise in the East and decline in the West' dynamic that is prevalent in the NEV industry marks a profound change from the traditional pattern of industrial development. In 2021, China's automobile production accounted for over 30% of the global total, while the shares of Japan and the United States were only around 10%. In the Chinese domestic market, ordinary consumers' recognition of local NEV brands has surpassed that of foreign multinational brands, as local brands have broken through a longstanding barrier that they had been unable to overcome in the traditional fuel vehicle market. Major multinational companies have had to repeatedly lower the prices of their NEVs, with their NEVs, in some cases, being cheaper than

traditional fuel vehicles. After impressive showings by Chinese enterprises at auto shows in Shanghai and Munich in 2023, multinational automotive giants began investing in or cooperating with Chinese NEV companies, hoping to accelerate their own transformation by leveraging the technology and product architecture of Chinese enterprises, such as Volkswagen's investment in XPeng, Stellantis' investment in Leapmotor, and Audi's cooperation with SAIC.

The Unfolding Conflict: A 'New World War' in the Automotive Industry

Reflecting on the automotive wars of the 1960s to 1990s, one can almost certainly predict that NEVs will become the focus of intense competition among major industrial countries in the new era. The COVID-19 pandemic and the Russia-Ukraine war have exacerbated the economic difficulties in European countries, leading major Western nations to adopt significant protective economic policies to support the development of their domestic NEV industries.

In August 2022, the United States passed the Inflation Reduction Act. This act will invest \$369 billion to incentivise the development of industries related to new energy, particularly providing highly exclusive subsidies and protective clauses for the US domestic NEV and key component industries. Under the act, consumers can receive a tax credit of up to \$7,500 for purchasing NEVs, provided that the vehicles are assembled in the United States and a certain proportion of the battery pack components and key battery materials come from US domestic enterprises.¹⁶ This move is part of broader US efforts to attract vehicle and key component companies from Europe, Japan, and South Korea to invest and set up factories in the United States. In December 2023, the US government proposed new rules regarding electric vehicle tax credits, directly restricting US electric vehicle manufacturers from sourcing battery materials from China or other competing countries. Meanwhile, the National Defense Authorization Act for Fiscal Year 2024, passed at the end of 2023, prohibits the US Department of Defense from purchasing batteries from Chinese companies such as CATL and BYD starting in October 2027. In late February 2024, the White House released a statement on 'national security risks to the US auto industry', in which President Biden explicitly instructed the US Department of Commerce to investigate and take actions to 'respond to the risk' posed by connected vehicles using technologies linked to China.

The Inflation Reduction Act and other US policies not only impact China's exports but also exacerbate Europe's difficulties. As traditional automotive powerhouses, France and Germany jointly issued a statement in November 2022 to strongly counter the challenges posed by the Inflation Reduction Act, with France even proposing a 'Buy European Act'. In February 2023, the European Commission proposed the Green Deal Industrial Plan and, in March, the EU successively unveiled drafts of the Net-Zero Industry Act and the Critical Raw Materials Act as key pillars of the plan. The former aims to stimulate investment in green industries by simplifying regulatory frameworks and improving the investment environment, listing battery technology as one of eight strategic net-zero technologies. The latter requires a certain percentage of strategic raw materials to be mined and processed locally to strengthen the security of supply chains for key raw materials and clean technology products. These two acts entered into force May and June of 2024, respectively. In the EU, 21 member states already offer direct subsidies for consumers purchasing NEVs, with France's new industrial policy tightening the scope of subsidies by linking subsidy standards to carbon footprints, thus imposing requirements on carbon emissions during production. In May 2023, then French finance minister Bruno Le Maire stated that 40% of France's electric vehicle subsidies flowed to Asian car companies, and that the new policy essentially aimed to reserve subsidies for European domestic

manufacturers. In December 2023, the French government announced the NEV models eligible for a subsidy of up to 7,000 euros, excluding models produced in China.¹⁷

The EU also has adopted targeted measures for the key component industry of power batteries. In August 2023, the EU Batteries and Waste Batteries Regulation officially came into effect, imposing three mandatory requirements for locally produced and imported batteries in the EU: first, a battery passport must be provided, detailing the source of battery minerals, the content of rare metals, the number of battery cycles, and more; second, battery manufacturers are required to recycle old batteries and use a certain proportion of recycled materials in new battery production; third, the carbon footprint of the entire lifecycle of the battery must be provided. This move aims to curb the positive export momentum of China's lithium battery industry to the EU and seeks to buy time for the development of the European domestic battery industry. This situation is similar to the US-Japan automotive war gradually spreading from the vehicle sector to key components during the late 1990s.

Faced with the rapid growth of China's electric vehicle exports to Europe, the EU has even adopted more direct protectionist policies. According to data from the China Passenger Car Association, the number of pure electric vehicles exported from China to Europe reached 338,000 units in 2022, an increase of 94% year-on-year. In the first eight months of 2023, the number of pure electric vehicles exported to Europe has already reached the scale of the entire year of 2022. In early October 2023, the European Commission launched an anti-subsidy investigation into pure electric vehicles from China, raising the level of suppression of Chinese electric vehicle exports to new heights. The legal basis for the anti-subsidy investigation comes from the Foreign Subsidies Regulation passed by the EU in November 2022. This regulation defines 'foreign government subsidies' broadly, including preferential loans, tax reductions, and low-cost land or energy provision; additionally, some common commercial transactions, such as obtaining loans from policy banks or state-owned commercial banks, debt/equity swaps, debt restructuring, equity investments from government investment funds, and government public procurement, may also be recognised as foreign financial support; state-owned enterprises with government capital injections may also be recognised as receiving subsidies. In fact, the prices of domestically produced cars exported to Europe from China are generally higher than those in the domestic market.

Besides providing a legal basis for anti-subsidy investigations, the Foreign Subsidies Regulation introduces two additional investment review tools, significantly impacting Chinese enterprises' investment and operations in Europe. As of October 2023, companies engaged in mergers and acquisitions and public procurement activities in the EU are required to notify the European Commission in advance if they have received foreign subsidies and to meet the relevant reporting thresholds within the past three years. The maximum penalty for violations can be up to 10% of the company's total annual revenue from the previous year. These regulations will greatly increase the transaction costs, extend the preparation period, and add uncertainty to Chinese enterprises' activity in Europe. Some industry insiders predict that the strategy of acquiring excess capacity from European local factories or merging with poorly performing enterprises will face significant obstacles in the future.

The Way Forward: 'A New Type of Globalisation'?

Facing intense global competition, any optimistic theory of a 'quick victory' for China's NEV industry is likely unrealistic. The growing protectionist tendencies among major industrial countries will prolong the

competition process in mainstream European and US markets, thereby granting more time for Western multinational giants to progress in the automotive energy transition. Under the influence of protective policies, the US and European countries will lobby for more direct investments from Chinese or other East Asian parts and vehicle companies into their local markets. Simultaneously, multinational corporations will be more active in trying to acquire NEV technology assets from China through investments and mergers to accelerate their own transitions. The production capabilities, brand influence, and market channels that these multinational companies have established globally over their long development histories will also be valuable resources in their transition processes.

Reflecting on the previous ‘world war’ of the automotive industry, on the one hand, Japanese and Korean companies broke into the mainstream markets of developed countries by relying on product quality, technological level, and new models, despite the established market share held by traditional large automobile manufacturers. This, in turn, promoted the continuous improvement of their technologies and products. On the other hand, Japanese and Korean companies also achieved rapid global sales growth by exploring new markets, thanks to their excellent product quality and the recognition they received in mainstream markets. According to export data from the Japan Automobile Manufacturers Association, from 1975 to 2023, in addition to gaining recognition in the European and North American mainstream markets, Japan’s automobile exports to other countries and regions accounted for about 38% of the average share of overseas markets, reaching 48% in 2022.

Currently, Chinese NEV companies are also actively exploring previously underdeveloped emerging markets, with regions such as South Asia, Southeast Asia, and the Middle East becoming growth points for Chinese NEV exports. In 2022, China exported more than 50,000 NEVs to each of Thailand, the Philippines, India, and Bangladesh ; nearly 80,000 units were exported to Thailand alone, accounting for 7% of the total NEV exports. In 2022, China’s NEV exports to Israel and the United Arab Emirates grew rapidly from less than 10,000 units in 2021 to nearly 40,000 units, and the number of exports to Uzbekistan, Jordan, and Turkey surpassed 10,000 units for the first time. Additionally, in 2023, Chinese NEV exports also performed well in countries like Australia, New Zealand, and Brazil. According to data from the International Organization of Motor Vehicle Manufacturers, in 2020, the US had 860 cars per 1,000 people, Europe had about 518, and China only had 223; some South Asian and Southeast Asian countries had not yet reached 100 cars per 1,000 people. These countries and regions have large populations and significant potential for increased car ownership per capita, but lack domestic NEV manufacturing capabilities.¹⁸ Moreover, countries like Thailand, Indonesia, and Vietnam have implemented tax incentives, purchase subsidies, and consumption tax reduction and exemptions for NEV imports, as well as foreign investment subsidies, providing a great opportunity for Chinese products, technologies, and industrial chains to go abroad.

However, developing markets in the Global South also presents new challenges for China’s automotive industry, including the NEV industry’s mandatory regulations in areas such as infrastructure, environmental protection, and safety. For example, China has not joined the ‘1958 Agreement’, meaning that Chinese NEV exports still need to undergo separate testing and certification procedures in overseas markets, which poses certain risks and increases export costs.¹⁹ Currently, China is developing a testing and certification alliance with some developing country governments in the NEV export process. In the future, opportunities and challenges will coexist in promoting related products and testing standards abroad.

More importantly, to successfully promote the internationalisation of Chinese NEVs, China must explore a

‘new type of globalisation’. Logically, the traditional model of globalisation shaped by multinational corporations has inherent limitations in value creation and distribution. They have built a pyramidal structure globally: at the top, Western countries possess core technologies, exporting management, capital, and some production equipment, and dominate the value chain to reap high profits; at the bottom, developing countries mainly provide cheap resources and labour, earning relatively meagre returns while bearing environmental costs. This model’s inherent flaw is that cheap labour earning minimal incomes cannot become consumers of the complex technological products they produce. Workers from developing countries, who constitute the majority of the population, can consume clothing, shoes, and daily necessities produced by this world system, but generally are unable to purchase complex technologies or products like NEVs, smart grids, or cloud computing services. In fact, during the ‘three-plus-one’ (export processing with supplied materials, samples, or components, plus compensation trade) or ‘market for technology’ development models of the 1990s, most of China’s population could not afford the complex products produced locally in China.

The realistic expectations of international competition and China’s population size both determine that China must embark on a ‘new type of globalisation’. First, developed countries still possess advantages in scientific and technological capabilities and capital accumulation, making them very strong competitors. China cannot solely rely on NEVs to completely replace their share in the global automotive industry. Assuming a world where China completely replaces the G7 countries is unrealistic. Second, China’s population is nearly twice that of the G7, which means that China cannot drive the vast majority of its population from middle to upper-middle and high-income levels simply by replicating the existing globalisation logic or by hoping to replace the market share of developed countries. This implies that Chinese industrial practitioners must substantially promote the industrialisation process of Global South countries, transforming the emerging working class of those countries into consumers of complex industrial products through NEV capacity exports and infrastructure development. At the same time, China needs to vigorously promote innovation-based domestic circulation, forming local strength in product innovation and frontier technology development agendas, ensuring that innovation activities centred on domestic technological agendas and market demands involve a broader international scope, incorporating the industrialisation activities of Global South countries into China-related value chains to secure China’s competitive advantage in exporting technology, industry, and standards.

It is important to emphasise that the industrialisation process of Global South countries is not solely determined by China or other developed nations. As China’s rise gradually breaks the control of the US-led system over China, it also eliminates the possibility of replicating such a system. The ‘great changes unseen in a century’ that the world is undergoing not only alter the relationship between China and the global system but also drive the emergence of economic autonomy in some developing countries. In the context of the NEV industry, there is currently a separation between the supply of raw materials and the production of critical metals such as lithium, nickel, and cobalt on a global scale. Some mineral-rich countries, which hold key metal resources, are increasingly asserting their autonomy. They seek to leverage their positions for greater benefits and have started to form OPEC-like organisations for metals in relevant fields. This reality requires China to view the relationship between its development and the Global South with a long-term perspective. Economic cooperation achieved through complex industrial collaboration under equal external conditions is more robust than relationships built merely on goods trade or simple industrial cooperation. Therefore, ensuring the safe and efficient global operation of China’s NEV and other industrial sectors, while promoting the industrialisation process in more Global South countries and generating consumers with the purchasing power for complex technological products and industries, is not only an important topic in terms of China’s

long-term industrial competitiveness but also a central issue concerning the construction of a global community with a shared future for humankind.

Notes

¹ This paper is a preliminary result of the research project ‘Research on Optimising the Innovation Environment to Support the Improvement of Innovation Efficiency in the New Energy Vehicle Industry’, commissioned by the National Academy of Innovation Strategy of the China Association for Science and Technology.

² James P. Womack, Daniel T. Jones, and Daniel Roos, *The Machine That Changed the World* (Rawson Associates, 1990).

³ Jean-Paul Rodrigue, *The Geography of Transport Systems*, 6th ed. (Routledge, 2024).

⁴ Vaclav Smil, *Made in the USA: The Rise and Retreat of American Manufacturing* (MIT Press, 2013).

⁵ Xia Dawei, Shi Donghui, and Zhang Lei, 汽车工业:技术进步与产业组织 [Automobile Industry: Technological Progress and Industrial Organization] (Shanghai University of Finance & Economics Press, 2002).

⁶ In this automotive battle, the story between Europe and Japan is broadly similar to that between the United States and Japan. However, Japanese automotive companies have achieved less success in investing and establishing factories in Europe compared to the United States. See Timothy Sturgeon and Richard Florida, ‘Globalization and Jobs in the Automotive Industry’ (MIT Industrial Performance Center Working Paper Series, MIT-IPC-00-012, Massachusetts Institute of Technology, Cambridge, MA, 2000).

⁷ Pei Guifen and Li Xiaoxiao, ‘日美贸易摩擦与日本结构改革’ [Trade Friction between Japan and the United States and Structural Reform in Japan], 日本问题研究 [Japanese Research], no. 3 (2019).

⁸ Matthias Holweg, ‘The Evolution of Competition in the Automotive Industry’, in *Build to Order: The Road to the 5-day Car*, ed. Glenn Parry and Andrew Graves (Springer, 2008), 13–14.

⁹ In China, the automotive industry is also crucial for driving economic growth and employment. According to data from 2002, for every one percentage point increase in the value added by the national automotive industry, it stimulated a 1.7 percentage point increase in other economic sectors. There are approximately two million workers directly involved in automobile production annually, with a total of 27.9 million people employed in related sectors, accounting for 1.6% and 13.5% of the national workforce, respectively. See Huang Zhengxia, ‘电动汽车:21世纪汽车工业的方向’ [Electric Vehicles: Direction of the 21st Century Automotive Industry], 当代经济 [Contemporary Economics], no. 5 (2003).

¹⁰ In official statistics from various countries, there are slight variations in the definition of ‘automotive-related industries’, so comparisons between countries may not be entirely accurate. The point being made here is that

for Japan, the European Union, and the United States, the automotive industry holds significant employment absorption capabilities and is a crucial sector that governments cannot afford to neglect.

¹¹ The data is sourced from the Japan Automobile Manufacturers Association (JAMA), the European Automobile Manufacturers' Association (ACEA), and the US Bureau of Labor Statistics (BLS).

¹² The 'three verticals and three horizontals' framework set out research and development priorities in the NEV sector, with the 'three verticals' referring to vehicle types (hybrid vehicles, pure electric vehicles, and fuel cell vehicles) and the 'three horizontals' referring to key technologies (battery development and innovation, charging and refuelling infrastructure, and connectivity and autonomous driving technology).

¹³ In China, autonomous driving technologies are categorised into six levels, ranging from level 0 (L0), which requires complete human control over the driving process, to level 5 (L5), which requires no human intervention.

¹⁴ In 2017, the government introduced the 'dual-credit' system for passenger vehicle manufacturers, which manages average fuel consumption and NEV credits concurrently. For fossil-fuel-powered vehicles, the assessment criterion is fuel consumption; vehicles meeting the standard earn positive credits, while those failing to do so earn negative credits. For NEVs, the criterion is the proportion of NEV sales to total vehicle sales, with credit calculation rules considering other technical parameters. Negative credits for fossil-fuel-powered vehicles can be offset through carryover, transfer within affiliated enterprises, or deduction using positive credits from NEVs. However, negative credits for NEVs can only be offset by purchasing positive credits from other enterprises. See Miao Wei, 换道赛车：新能源汽车的中国道路 [The Race to Change Lanes: China's Road to New Energy Vehicles] (Posts & Telecom Press, 2024).

¹⁵ Monthly sales were affected around the time of changes in government subsidies, but overall, they continued to increase.

¹⁶ The bill requires a yearly increase of 10% in the localisation rate of battery pack components and battery raw materials from 2023 to 2029. Canada and Mexico have been included in the exemption clause.

¹⁷ An Limin, '中国产电动汽车失去法国补贴资格' [Chinese Electric Vehicle Production Loses Eligibility for French Subsidies], *Caixin Online*, 15 December 2023.

¹⁸ It is generally believed that a market reaches saturation when there is approximately one car for every three people, on average. This indicates that, as per capita income levels rise in many developing countries and regions, there is a vast potential consumer market for automobiles.

¹⁹ Under the framework of the '1958 Agreement', contracting parties certify products under the same set of regulations, allowing for mutual recognition of certifications and enabling direct market entry without the need for repeated certifications for exports.



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