Development and Competitive Advantages in the NEV Industry of China and the United States

Zixi Huang

Suzhou Industrial Park Foreign Language School, Suzhou, 215021, Jiangsu, China

22203@ibsipfls.onmicrosoft.com

Abstract. In the global shift toward sustainable transportation, China and the United States have taken distinct policy approaches to developing their electric vehicle (EV) industries. By 2023, China accounted for over 60% of global EV sales and nearly 80% of global battery production, driven by integrated long-term policies covering R&D, infrastructure, incentives, and exports. In contrast, the U.S.-home to innovators like Tesla-emphasizes high-end technology and market-driven growth, yet faces challenges from fragmented infrastructure and unstable policy continuity. This report compares their development paths and policy frameworks, finding that China's centralized coordination fosters consistent growth, while the U.S. must strengthen intergovernmental coordination and long-term planning. These insights offer valuable lessons for other countries aiming to scale their EV industries and contribute to global climate goals.

Keywords: NEV Industry; Competitive Advantages; battery production

1 Introduction

Global electric vehicle industry has been thriving for the last decades under the overall concerns of climate change and global sustainable development. As the main part of transportation, electric vehicles (EV) play a major role in the realization of energy transmission and emission reduction in various countries and the realization of global Net Zero Emission 2050 goal [1]. China and the United States are the two dominant players in the global electric vehicle (EV) industry, each with distinct strengths and development approaches. China's EV sector has grown rapidly due to strong government support, a large domestic market, and leading battery manufacturing capabilities, making it the world's largest EV exporter. In contrast, the U.S. focuses on technological innovation, high-end market segments, and manufacturing reshoring, with companies like Tesla pioneering advancements in vehicle software and autonomous driving. Despite their successes, both countries face challenges: China must achieve transition from policy-driven growth to a market-based model, while the U.S. grapples with policy uncertainty and infrastructure limitations. Together, their complementary strengths position them to continue shaping the future of sustainable transportation globally.

X. Pan et al. (eds.), *Proceedings of the 2026 11th International Conference on Financial Innovation and Economic Development (ICFIED 2026)*, Advances in Economics, Business and Management Research 382,
https://doi.org/10.2991/978-94-6239-642-5_66

The electric vehicle industry plays a crucial role in the global energy transition and emissions reduction, serving as a key pillar for achieving sustainable development and climate goals. In 2022, more than half of the EVs in use worldwide were in China, and the United States was the third-largest EV market with the highest sales growth rate in the world. Although both are major developing countries of EVs, China far surpasses the United States in terms of sales volume and output. But not until 2015 was the U.S. the largest EV market, followed by China [1]. Under the global Net Zero Emission 2050 goal, both China and the U.S. emphasize the significant role of the EV industry to reduce carbon emissions and realize sustainable development, as well as to compete in the global market and climate politics. By 2030, almost one in three cars on the roads in China is electric, and almost one in five in the United States, as is reflected in IEA's Stated Policies Scenario [2]. The rapid uptake of EVs of all types – cars, vans, trucks, buses, and two/three-wheelers – avoids 6 million barrels per day (mb/d) of oil demand in 2030, and over 10 mb/d in 2035. This is equivalent to the amount of oil used for road transport in the United States today [3].

How to promote further development of EV industry is a key issue of national energy security, energy conservation and emission reduction, as well as industrial deployment for China and the U.S. By comparing the two biggest economic entities and their different orientations of policy in EV industry, this paper might be insightful for EV industrial development in other countries and their policy making process. Furthermore, this paper might provide ideal patterns for achieving zero emissions and help international society realize sustainable collaboration.

2 The Current Status and Trends of the EV Industry

2.1 Development of China's EV Industry from a Policy Support Perspective

New energy vehicles (NEVs) are a key focus for future competition among major automotive nations [4]. Fig.1 shows the global trends of electric vehicle sales, according to the report published by IEA. As evidenced, global electric vehicle (EV) sales have exhibited steady exponential growth year-over-year. Both China and the United States have maintained upward trajectories in EV sales, with China overtaking the U.S. as the global market leader around 2016 and solidifying its central role in the international EV ecosystem through robust industrial policy and dominant battery production capabilities [5].

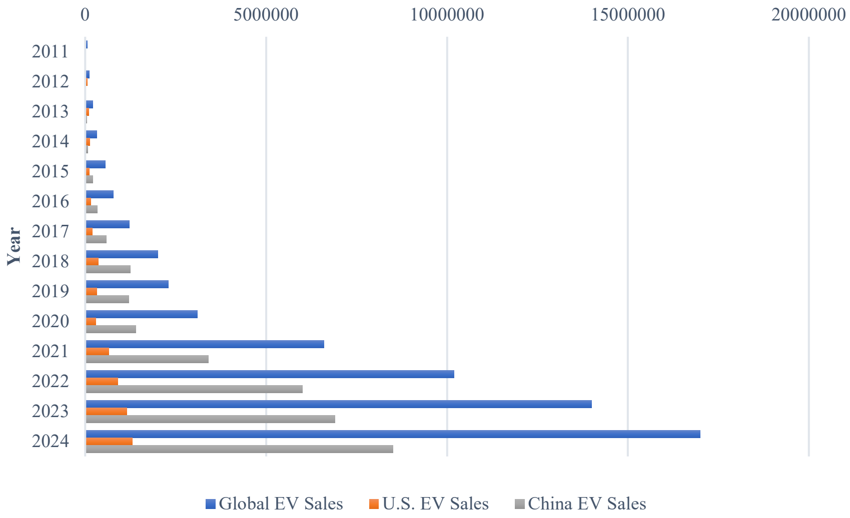

Fig. 1. Trends in Electric Vehicle Sales: China vs. U.S., 2011-2024.

The strong rise of China's new energy vehicle industry has been significantly driven by policy support. Table 1 summarizes relevant policies for EVs in China, including subsidy policies that began in 2014. These subsidies reduced financial pressure on manufacturers from the production side and increased consumer purchasing intent from the consumption side, leading to a noticeable increase in EV sales in China [6]. According to IEA reports, China maintained consistent sales growth even after phasing out purchase subsidies in 2023, achieving 8.1 million new registrations (35% YoY increase). This momentum continued in 2024 with nearly 40% growth, contributing significantly to global sales reaching 17 million (+25%). While Europe briefly surpassed China in 2020 (1.4 million vs 1.2 million units) during pandemic disruptions, China quickly regained and solidified its leadership position from 2021 onward. This sustained growth trajectory demonstrates China's successful transition from policy-driven to market-driven EV adoption.

Table 1. China's Policies on Electric Vehicles.

Year	Policy	Content
2009	Interim Measures for the Management of Financial Subsidies for Demonstration and Promotion of Energy-saving and New Energy Vehicles	Demonstrative promotion of new energy vehicles in the public service sector was carried out in 13 cities, with a maximum subsidy of 60,000 yuan per pure electric vehicle. Public transportation was the main focus, laying the foundation for industrialization, but the promotion volume was lower than expected
2010	Notice on Conducting Pilot Programs for Subsidies for Private Purchase of New Energy Vehicles	Private purchase subsidies were piloted in five cities including Shanghai, with a maximum subsidy of 60,000 yuan per pure electric vehicle and 50,000 yuan per plug-in hybrid vehicle. This marks the

Year	Policy	Content
		first time subsidies have been extended to the private sector, exploring market-oriented approaches
2012	Energy-saving and New Energy Vehicle Industry Development Plan (2012-2020)	Establish ‘pure electric drive' as the main technical route, and require the implementation of preferential policies such as license plate benefits and reduced parking fees for new energy vehicles
2014	The State Council's executive meeting decided to exempt new energy vehicles from purchase tax	From September 2014 to the end of 2017, vehicle purchase tax was exempted for pure electric, plug-in hybrid, and fuel cell vehicles. This reduced the cost of buying cars and stimulated consumer demand, resulting in a 220% increase in sales volume in 2014 compared to the previous year
2017	Management Measures for the Parallel Implementation of Average Fuel Consumption Standards for Passenger Vehicles and New Energy Vehicle Credits	Set new energy vehicle credit ratio (starting at 10% in October 2019), companies that fail to meet the target must purchase credits. After the subsidy tapering, the 'Dual Credit' policy pushes automakers to transition to electrification
2019	Notice on Further Improving the Financial Subsidy Policy for the Promotion and Application of New Energy Vehicles	Subsidies for pure electric vehicles have been raised to a range of 250 kilometers, local subsidies have been canceled, and after the transition period, subsidies will decrease by more than 50%. Technical thresholds have been increased, and low-end production capacity will be phased out
2023	Announcement on Extending and Optimizing Tax Exemption Policies for New Energy Vehicle Purchases	From 2024 to 2025, purchase tax exemptions will apply (with a maximum exemption of 30,000 yuan per vehicle). From 2026 to 2027, the tax will be halved (maximum of 15,000 yuan per vehicle). This aims to mitigate the impact of phasing out subsidies and stabilize market expectations
2025	Several mandatory national standards have been implemented (such as GB 39752-2024, GB 44263-2024)	Strengthen safety supervision, respond to frequent accidents, and establish technical red lines from multiple dimensions such as batteries, charging, and intelligent driving

In addition to subsidy policies, the introduction of China's green transformation policies and changes in the production volume of traditional vehicles also guide market choices. Fig.2 shows the production and sales situation of China’s automotive manufacturing industry from 2017 to 2024, as well as the proportion of EV production in total automobile production [6]. It can be seen that traditional vehicle production and sales have declined significantly, while EV production and sales show an upward trend, with their share in automobile production increasing year by year, demonstrating a clear substitution trend. Although EV production and sales declined since 2022 due to multiple pressures-such as reduced policy subsidies, rising battery raw material prices, and pandemic-induced supply chain disruptions-the overall trend remains upward [7]. Driven by supportive and guiding policies, technological advancements, and growing consumer environmental awareness, the development of EVs and their replacement of traditional vehicles has become an inevitable trend.

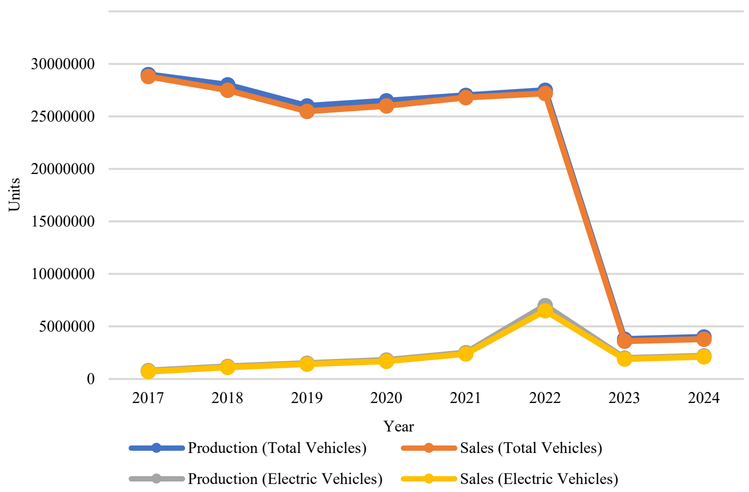

Fig. 2. Production and Sales of Vehicle in China, 2017-2024 in terms of produced units.

China's globally leading advantages and investment attraction policies have created a golden opportunity for Chinese new energy vehicles (NEVs) to expand globally. According to China Statistical Yearbook 2020-2024, Fig.3 shows China's automobile export situation from 2020 to 2024, including the share of automobile export value in GDP and the proportion of EV exports in total automobile exports. Both the share of automobile export value in GDP and its absolute value have shown a clear upward trend. Specifically within this category, the proportion of EV exports within total automobile exports has also risen steadily.

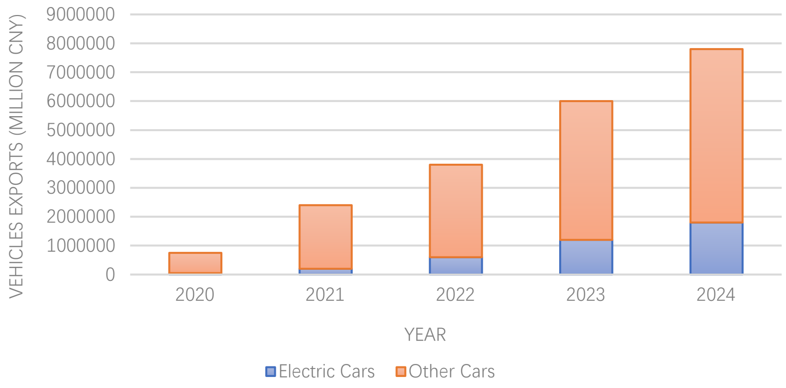

Fig. 3. Vehicle Exports Performance of China, 2020-2024.

2.2 Development of U.S.'s EV Industry from a Policy Support Perspective

As shown in Table 2, the rise of the U.S. low-emission vehicles has been significantly shaped by policy interventions, though policy volatility has limited its growth momentum compared to China. The 2008 Emergency Economic Stabilization Act introduced a $7,500 federal tax credit per vehicle, while California's ZEV mandate compelled automakers to produce zero-emission vehicles. These measures, coupled with the success of premium models like Tesla's Model S, helped the U.S. capture 40% of the global EV market by 2015. However, the Trump administration's relaxation of fuel economy standards (2017-2020) and failure to extend subsidies slowed EV adoption, allowing China-which maintained incentives and expanded charging infrastructure-to pull ahead. The tide turned with the 2021 Infrastructure Investment and Jobs Act and 2022 Inflation Reduction Act (IRA), which revitalized U.S. EV growth through sustained policy support. By September 2024, federal grants and loans exceeding $28 billion had mobilized $157.3 billion in private investment for EV and battery manufacturing.

Despite trailing in sales volume, the U.S. remains competitively strong in EVs. While Chinese brands dominate global NEV sales due to their vast domestic market, their overseas presence-especially in premium segments-still lags behind Tesla and legacy automakers. EV Volumes data (2024) shows Tesla leading Europe's EV market for three consecutive years (10.1% share), followed by BMW, Mercedes, Volvo, and Volkswagen-with no Chinese automakers in the top 10.

Table 2. U.S.'s Policies on Electric Vehicles.

Year	Policy	Content
1990	California Zero-Emission Vehicle (ZEV) Program	It required that 2% of vehicles sold in California in 1998 be zero-emission vehicles, increasing to 10% by 2003. This was the first mandate for automakers to produce zero-emission vehicles, which led to the development of models
2008	Emergency Economic Stabilization Act of 2008	The first nationwide consumer incentive offers up to $7,500 in tax credits for plug-in hybrid vehicles
2009	American Recovery and Reinvestment Act of 2009	A $3 billion grant to support the trade-in of old cars for clean energy vehicles, along with investments in charging infrastructure. In response to the financial crisis, Tesla received a $465 million loan from the Department of Energy to promote electric vehicle technology development
2017-2020	Trump Administration's SAFE Vehicles Rule	Withdraw from the Paris Agreement, relax fuel economy standards (maintain CAFE at 40.1 miles per gallon for 2026), retain tax credits but cancel the extension proposal. Weaken federal incentives, with only a 0.06 ratio of chargers to electric vehicles, leading to a slowdown in market growth
2021	Infrastructure Investment and Jobs Act (NEVI Program)	The first national charging network plan, allocating $5 billion to build a nationwide charging network, aims to deploy 500,000 charging stations by 2030
2022	Inflation Reduction Act of 2022	Subsidies have been comprehensively upgraded, stimulating a surge in sales from 2023 to 2025. Tesla has regained subsidies due to domestic production. New and used car credits are now up to $7,500 and $4,000 respectively, with the removal of the cap on vehicle sales per manufacturer, replaced by localization requirements for batteries and assembly. Commercial trucks can receive up to $40,000 in credits
2025	U.S. District Court Ruling on NEVI Fund Injunction	Ruling that Trump's government's freeze on charging funds was illegal, and forcing the release of $5 billion
2025	Revised NEVI Program Guidance (August 2025)	Cancel the mandatory requirement for charging station coverage in rural areas and disadvantaged groups, simplify environmental impact assessments and minority business participation clauses, and prioritize fast charging on highways

2.3 Technological Competitiveness Comparison of China and the U.S.

Apart from the sales volume of innovative energy vehicles, the lithium-ion battery supply chain is also a significant indicator reflecting the global landscape of the shifting EV sector. This is because battery design and manufacturing are at the core of the competitiveness of innovative energy automobiles, and the cost of batteries accounts for about 40% to 45% of the total vehicle cost.

Compared to the traditional automotive sector chain, the EV sector chain, with vehicle production as its midstream segment, is continuously extending both upstream to raw materials and components, and downstream to automotive services [8]. Among these, the power battery is often called the “heart” of a new energy vehicle, and its supply chain includes stages such as mining, raw material processing, and battery production. Key minerals like lithium, cobalt, and nickel have also become crucial components of the automotive supply chain. According to Fig.4, the U.S. pioneered lithium battery vehicle technology, with its Competitive Advantage Index growing rapidly during 1993-1998 before stabilizing post-2017[9]. China's late entry saw slow initial growth before accelerating after 2010, surpassing Japan and Korea by 2017 to become the second-ranked nation by 2021.

While the U.S. maintained technological leadership, post-2022 policies introduced challenges. The Inflation Reduction Act (IRA) mandates that to qualify for tax credits and subsidies, EVs should meet stringent requirements on critical mineral sourcing, battery material origins, and final assembly-with a significant portion tied to North America. While the IRA has attracted substantial foreign investment in U.S. EV manufacturing, it has also raised production costs and intensified policy competition with non-subsidized regions. Furthermore, the Trump administration’s subsequent policy reversals have created uncertainty, stalling or jeopardizing investments reliant on government funding.

In contrast, China’s lithium battery industry has thrived under consistent policy support. Through strategic overseas investments and imports, China has secured and processed vast mineral resources. By 2024, China accounted for 70.22% of global lithium refining, 78.42% of cobalt, 31.32% of nickel, and 95.76% of graphite. China’s annual lithium battery production capacity reached 558 GWh in 2024, representing nearly 80% of global output, while the U.S. lagged at just 44 GWh (6% of global capacity) [10]. These figures underscore the significant role that China plays in the world battery supply chain, especially in the refining of the essential minerals and battery manufacturing capacities. The figures are further used to highlight the profound dissimilarity between China and other nations, especially the U.S., in terms of increasing the capacity to make batteries [11].

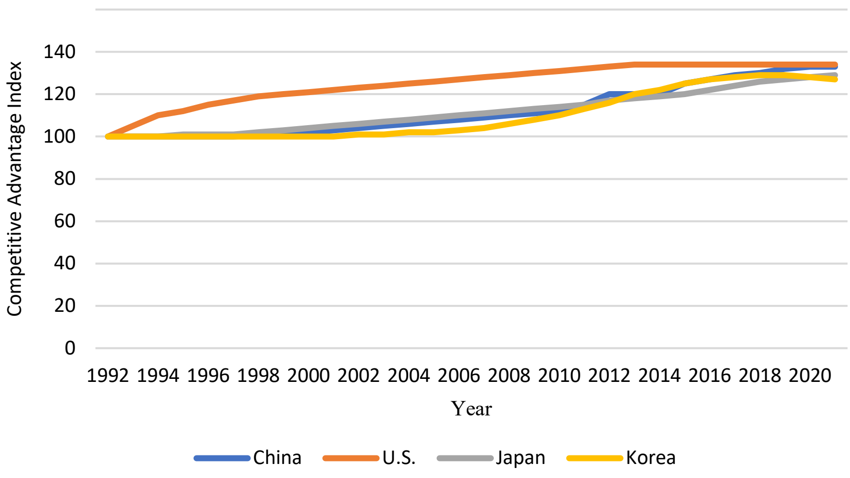

Fig. 4. Comparative Analysis of Technological Competitiveness.

3 Mechanisms of Electric Vehicle Industry's Impact on Sustainable Economic Development

The transition from internal combustion engine (ICE) cars to electric vehicles marks a major change in the auto industry. This transition has far-reaching implications for economic sustainability, influencing industrial restructuring, employment patterns, energy security, and environmental protection.

From an economic perspective, the expanding EV supply chain—spanning upstream battery production and downstream electrification and smart connectivity services—is creating high-value jobs and stimulating investment, enhancing long-term economic resilience. However, the decline of traditional auto manufacturing may cause short-term disruptions, including workforce displacement in conventional supply chains.

Table 3. Comparison of emissions between EVs and ICEVs.

	Manufacturing phase	Operation phase	Total lifecycle emissions
EV	10-15 tons CO_2	If powered by renewable energy (solar/wind): 2-5 tons CO_2 over 200,000 km.bIf powered by coal-heavy grid: 15-25 tons CO_2	20-40 tons CO_2
ICEV	7-10 tons CO_2	Gasoline combustion emits 2.3 kg CO_2 per liter. Over 200,000 km (50,000 liters fuel): 100-120 tons CO_2	110-130 tons CO_2

Environmentally, EVs play a pivotal role in reducing CO_2 emissions and controlling shifting climatic conditions. As shown in Table 3, battery electric vehicles (BEVs) emit just 63g CO_2/km-a 73% reduction compared to internal combustion engines. While BEV production generates-40% higher emissions due to batteries, this gap is offset after -17,000 km of driving (1-2 years of normal use). Fig.5 confirms BEVs' lifecycle emission advantages [12]. However, battery material mining (lithium, cobalt, nickel) remains energy-intensive, highlighting the need for holistic lifecycle analysis beyond operational benefits [13].

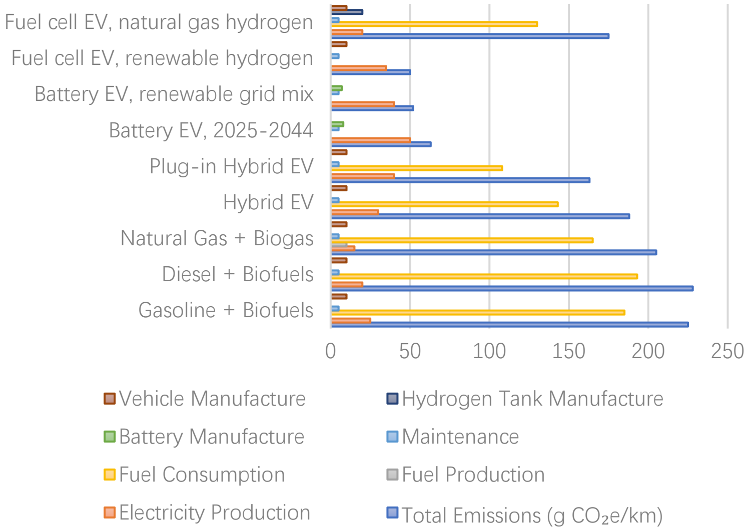

Fig. 5. Life-cycle GHG emissions of medium segment passenger cars sold in the European Union in 2025.

4 Conclusion

This article offers an expansive evaluation of the development status and competitive differences between the Chinese and U.S. new energy vehicle (NEV) industries. China has achieved rapid growth in EV sales through consistent policy support (e.g., subsidies, charging infrastructure investment), holding a dominant position in the global market (accounting for 80% of global production capacity in 2024). In contrast, policy fluctuations in the U.S. (e.g., the IRA and Trump-era policy reversals) have attracted investment but resulted in weaker growth momentum. Technologically, China excels in the lithium battery supply chain (refining over 70% of global lithium/cobalt) and localized production (achieving over 90% self-sufficiency in component production), while the U.S. maintains competitiveness in the premium market through companies like Tesla. Environmentally, EVs demonstrate significant lifecycle emission reduction advantages (73% lower than ICE vehicles), though sustainable mineral sourcing for batteries remains a challenge.

Against the backdrop of NEVs reshaping global industrial, innovation and value chains, this sector demonstrates significantly stronger industrial linkages, innovation-driving capabilities and economic multiplier effects compared to traditional automobiles. China and the U.S. exhibit highly complementary advantages in this field: China leads in battery manufacturing and mass production, while the U.S. maintains technological leadership in autonomous driving systems and advanced semiconductors. Such complementarity creates unique opportunities for bilateral cooperation. Through joint R&D to reduce innovation costs, supply chain coordination to enhance efficiency, and market opening to expand scale, the collaboration can not only achieve mutual benefits but also jointly address the shifting climatic challenges and accelerate the global evolution to sustainable transportation.

References

1. Xiang, C., Zheng, X., Xie, L. How can China's power sector reform reduce carbon emissions? A long-term competition perspective. China Economic Review, 80, 102000 (2023)
2. Global EV outlook 2024, https://www.iea.org/reports/global-ev-outlook-2024,2024/4/23
3. Global EV outlook 2023. https://www.iea.org/reports/global-ev-outlook-2023,2023/4/26
4. Khaleel, M., Nassar, Y., El-Khozondar, H. J., Elmnifi, M., Rajab, Z., Yaghoubi, E., Yaghoubi, E. Electric vehicles in China, Europe, and the United States: Current trend and market comparison. International Journal of Electrical Engineering and Sustainability (IJEES). 1-20 (2024)
5. Tian, J., Wang, P., Zhu, D. Overview of Chinese new energy vehicle industry and policy development. Green Energy and Resources, 2(2), (2024)
6. Operational Report on China's Automotive Industry Economy, https://www.miit.gov.cn/gxsj/tjfx/zbgy/qc/art/2025/art_a8895b6aa6d449e2861d027b0d85a2dd.html,2024/12
7. Ma, Y., Duan, S., Zhang, P., Zhang, T.. Multi-scale analysis of the co-movement between China's new energy vehicle industry and Tesla: Evidence from capital market. Energy & Environment, 36(4), 2027-2048(2025)
8. Ge, Y., Chen, K. Selection of Production Strategies for New Energy Vehicles: An Analysis of the Impact of Government Intervention Policies. Systems, 13(1), 61(2025)
9. Yang, Y., Song, S., Lei, S., Sun, W., Hou, H., Jiang, F., Hu, Y. A process for combination of recycling lithium and regenerating graphite from spent lithium-ion battery. Waste Management, 85, 529-537(2019)
10. Trends in electric car markets in Global EV Outlook, https://www.iea.org/reports/global-ev-outlook-2025/trends-in-electric-car-markets-2, 2025/8/10
11. China statistical yearbook 2024, https://www.stats.gov.cn/sj/ndsj/2024/indexeh.htm,2025/7/15
12. Yang, X., Nielsen, C. P., Song, S., & McElroy, M. B. Breaking the hard-to-abate bottleneck in China's path to carbon neutrality with clean hydrogen. Nature Energy, 7(10), 955-965(2022)
13. Malik, F. H., Ayadi, W., Hussain, G. A., Haider, Z. M., Alkhatib, F., Lehtonen, M. Evaluating Carbon Emissions: A Lifecycle Comparison Between Electric and Conventional Vehicles. World Electric Vehicle Journal, 16(5), 287 (2025)
14. Negri, M., Bieker, G. Life-cycle greenhouse gas emissions from passenger cars in the European Union: A 2025 update and key factors to consider. International Council on Clean Transportation,6(8), (2025)