MSI Journal of
Arts, Law and Justice (MSIJALJ)

RESTRICTING GASOLINE VEHICLES, INCENTIVIZING ELECTRIC VEHICLES: CHINA'S LEGISLATIVE EXPERIENCE AND IMPLICATIONS FOR VIETNAM

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The authors declare that no funding was received for this work.

OPEN ACCESS

Received: 02-December-2025
Accepted: 16-January-2026
Published: 21-January-2026

This article is published by **MSI Publishers** in **MSI Journal of Arts, Law and Justice (MSIJALJ)**
ISSN 3049-0839 (Online)

The journal is managed and published by MSI Publishers

Volume: 3, Issue: 1 (January-2026)

ABSTRACT: Urban air pollution and carbon-neutrality commitments are creating an urgent need to accelerate the transition to electric vehicles (EVs). This article: (i) systematizes and evaluates Viet Nam's current legal framework governing the green transport transition, including technical and safety standards, charging infrastructure, fiscal and non-fiscal incentives, battery recycling responsibilities, public procurement, and spatiotemporal restrictions on gasoline vehicles; (ii) conducts a selective comparison with China's experience, where standards, infrastructure development, and incentive packages have been implemented in an integrated manner across the vehicle life cycle; and (iii) proposes a roadmap for legal refinement in Viet Nam. The findings identify three major gaps: (1) legal fragmentation; (2) incentive and regulatory instruments that are insufficient to drive large-scale behavioral change; and (3) the absence of effective inter-sectoral coordination and monitoring and evaluation (M&E) mechanisms. The article recommends a "risk- and life-cycle-based legal toolkit," including interoperable standards for charging infrastructure; performance-, safety-,

and battery-recycling-conditional incentives; low-emission zones and phased restrictions on gasoline vehicles; public procurement as a market-pull mechanism; and an inter-agency coordination model supported by periodic M&E indicators.

Keywords: *electric vehicles; green transport; charging infrastructure; life-cycle-based incentives; battery recycling responsibility; comparative law; China; Viet Nam.*

1. Introduction

According to data released by IQAir (January 13, 2025), Hanoi has at times ranked among the world's most air-polluted cities; numerous domestic studies estimate that transport accounts for a significant share of urban emissions. From a legal perspective, several mechanisms remain underdeveloped or absent such as "conditional incentives," "control quotas," unified safety and charging-interoperability standards, sustainable frameworks for charging infrastructure (land use and planning), and battery recycling responsibilities resulting in a fragmented transition process. In the context of Viet Nam's commitment to achieving net-zero emissions by 2050 and the issuance of Decision No. 876/QD-TTg (July 22, 2022) on the green energy transition in the transport sector, completing the legal framework and designing policy instruments that are effective, proportionate, and feasible has become imperative.

2. Theoretical foundations for the roadmap to restrict gasoline vehicles and incentivize electric vehicles in Viet Nam

2.1. Concepts of green vehicle transition and the roadmap for restricting gasoline vehicles

2.1.1. Concept of green vehicle transition

The transition of green transport vehicles from fossil-fuel-based propulsion to electric energy is an inevitable process in the pursuit of sustainable development in the future. In Viet Nam, Decision No. 876/QD-TTg dated July 22, 2022 marked the launch of a program to transition vehicles in the transport sector toward the use of green energy in order to reduce emissions, articulating the view that "this is a profound technological transformation, grounded in modern institutions and

governance, advanced science and technology, and high-quality human resources." Decision No. 876 sets out a transition roadmap beginning with special-grade cities (Hanoi and Ho Chi Minh City), encompassing vehicle conversion and the development of charging stations, with the objective that by 2050 all transport vehicles will operate on green energy, thereby advancing toward the goal of a green transport system with net-zero emissions by 2050.

According to Le Thi Thanh Hang and Nguyen Thi Thuy Dung (2024), "the transition of vehicles is considered one of the positive behaviors associated with the circular economy (resource efficiency and environmental protection criteria) and sustainable development." Similarly, La Viet Phuong and Nguyen Minh Hoang (2023) affirm that "the transition process represents a new and highly significant period in the history of transport." Thus, the transition to green vehicles contributes to emission reduction, promotes the restructuring of the automotive industry, and fosters the emergence of new high-tech sectors such as EV battery manufacturing, electric motors, smart charging stations, and recycled materials.

From this analysis, green transport vehicle transition can be understood as a deliberate societal process aimed at reducing emissions, protecting the environment, and restructuring the transport ecosystem, through the shift from fossil-fuel-powered vehicles (gasoline and diesel) to vehicles using clean and renewable energy sources (electricity, hydrogen, biofuels, etc.). This process is governed by public policies and legal frameworks, scientific and technological progress, and the imperatives of sustainable development.

2.1.2. Concept of the roadmap for restricting gasoline vehicles

The roadmap for restricting gasoline vehicles aims to "rapidly reduce emissions from transport vehicles, thereby contributing to climate change mitigation," with the objective of gradually phasing out fossil-fuel-powered vehicles in Viet Nam based on environmental protection and sustainable development strategies embedded in public policy and law. Viet Nam became a Party to the United Nations Framework Convention on Climate Change (UNFCCC) in 1994, and its Net Zero commitment represents a continuation and concretization of actions under the Convention,

demonstrating strong determination to transform the transport model toward a low-carbon economy.

To implement Decision No. 876/QD-TTg, Directive No. 20/CT-TTg dated July 12, 2025 of the Prime Minister on "urgent and decisive tasks to prevent and address environmental pollution" establishes a gasoline-vehicle restriction roadmap for Hanoi in three short-term phases extending to 2030, with a long-term vision toward 2050. According to Directive No. 20/CT-TTg, the roadmap adopts a gradual approach, beginning with restrictions on fossil-fuel-powered motorcycles and mopeds and progressing to limitations on privately owned gasoline-powered cars within low-emission zones designated by Hanoi, with the ultimate goal of a complete transition to green vehicles by 2050.

From the above analysis, the roadmap for restricting gasoline vehicles may be understood as a legal and policy plan promulgated by competent state authorities, which specifies the sequence, timelines, and spatial scope for progressively restricting and ultimately terminating the production, importation, registration, and circulation of fossil-fuel-powered vehicles. This roadmap is accompanied by supportive and regulatory measures aimed at rapidly reducing transport-related emissions and protecting the environment.

2.2. Concept of incentives for electric vehicles

Vietnamese law does not provide a statutory definition of incentives for EVs. However, in the context of the green transport transition, a range of fiscal incentives has been adopted by the State, such as preferential treatment in special consumption tax, import duties, and fees. In addition, various non-fiscal incentives have been introduced through enterprise initiatives, including VinFast's zero-capital investment programs for charging-station partners, and V-Green's franchising model for electric motorcycle battery-swap cabinets with investment incentives and subsidized charging prices. Practical implementation shows that such incentives play a significant role in facilitating the vehicle transition roadmap.

According to Wenbo Li et al. (2019), "China has promulgated a series of policies that have led to a rapid increase in new energy vehicles (NEVs) and promoted the

widespread adoption of EVs." Similarly, Pham Ba Nam et al. (2022), in their study of EV-development policies in China, the United States, and the European Union, found that a common feature among these jurisdictions is the adoption of fiscal incentive policies to accelerate the EV transition. Incentive policies are therefore an indispensable condition and constitute a highly effective regulatory tool employed by the State. They contribute to accelerating vehicle transition and ensuring that the gasoline-vehicle restriction roadmap is implemented in a structured and state-guided manner.

Based on this analysis, EV incentives may be understood as a set of legal, financial, and administrative measures promulgated by the State or voluntarily provided by enterprises to encourage the development, adoption, and use of electric vehicles and related infrastructure. These incentives aim to reduce costs and risks associated with the production, business, and use of EVs, thereby stimulating both supply and demand and accelerating the green transport transition. Such incentives are typically time-bound and conditional (e.g., compliance with safety, environmental, performance, and battery-recycling standards) and are subject to outcome-based monitoring to ensure alignment with sustainable development objectives.

3. Legal framework governing and assessment of the legal framework for the green transport transition in Viet Nam

3.1. Legal framework governing the green transport transition in Viet Nam

3.1.1. Law on Investment 2020

Investment and business activities related to EVs involve multiple stages and sectors, ranging from research and development (including battery technology, electric motors, EV software, and control systems); the production of batteries, components, and spare parts; EV assembly; the construction of charging infrastructure (power grids, substations, and battery-swapping stations); to the trading and distribution of EVs in the market. However, the Law on Investment (LOI) does not recognize EV-related activities as an independent business line. Instead, relevant business activities are specified through subordinate legal instruments, including Appendix II of Decree No. 31/2021/ND-CP, Decision No. 38/2020/QD-TTg, and Decree No. 205/2025/ND-CP amending Decree No. 111/2015/ND-CP.

With regard to EV-related business lines eligible for investment incentives, the widespread adoption of EVs requires recognition that "the expansion of electric vehicles and sustainable mobility depends on a comprehensive strategy encompassing policy, technology, and infrastructure." Acknowledging the critical role of batteries given that "battery performance determines vehicle range and cost" as well as charging infrastructure, the Law on Investment identifies several priority high-tech investment sectors. These include research, application, and production of "fuel cells and high-performance lithium batteries with large capacity, long lifespan, high safety standards, and environmental friendliness," as well as "technologies for designing and manufacturing control equipment and power electronic conversion devices used for renewable energy generation stations, smart power transmission systems, and electric transport vehicles."

High-tech products encouraged for development in the EV sector include "fuel cells; lithium batteries and battery packs; energy storage systems using supercapacitors; advanced electrolytes and electrolyte membranes for fuel cells; efficient thermal management and control systems for fuel cells; digital protection devices and power quality assurance equipment; high-efficiency control equipment and power electronic conversion devices used for renewable energy generation stations, smart power transmission systems, and electric transport vehicles; as well as high-efficiency wireless charging equipment and stations." These EV-related investment activities are guided by Decree No. 31/2021/ND-CP as eligible for investment incentives pursuant to Clause 2, Article 15 of the Law on Investment 2020. In addition, the legal framework provides that the "list of priority industrial supporting products for the manufacturing and assembly of automobiles" is also classified as an investment-incentivized sector (Point d, Clause 1, Article 16 of the Law on Investment 2020).

With a view to expanding development and avoiding the concentration of EV investment and business activities solely in major urban centers, the Law on Investment further stipulates preferential investment locations in areas with difficult socio-economic conditions and particularly difficult socio-economic conditions, as specified in detail in Appendix II to Decree No. 31/2021/ND-CP. On July 1, 2025, Resolution No. 202/2025/QH15 on the reorganization of provincial-level

administrative units took effect, resulting in a total of 34 provincial-level administrative units nationwide following the reorganization. Overall, the Law on Investment 2020 and its implementing instruments have identified EV-related sectors eligible for investment incentives, thereby creating motivation for enterprises and investors to develop the EV industry, contributing to an increased supply to meet societal transition demands and supporting the implementation of specific policies, which are analyzed in detail by the author in Section 3.3.

3.1.2. Law on Environmental Protection 2020

EVs are an effective means of reducing greenhouse gas emissions. Research findings indicate that "EVs emit up to 97% less CO_2 equivalent than gasoline-powered vehicles and 70% less than diesel-powered vehicles." However, when assessing the entire life cycle from production to operation, several factors contribute to the environmental impact of EVs, including "the source of electricity generation, EV and battery manufacturing plants, battery recycling processes, driving conditions, and local climate." Among these, EV battery production and recycling exert the most significant environmental impacts.

Although the Law on Environmental Protection 2020 does not prescribe specific emission thresholds for EVs, it classifies battery and accumulator manufacturing activities into environmental impact categories. Specifically, battery manufacturing businesses with a "large-scale production capacity of 600 tons of products or 200,000 kWh per year or more" are classified under Group I, which involves high environmental risk. Meanwhile, operations with "medium-scale production of less than 600 tons of products or less than 200,000 kWh per year" fall under Group II, which entails adverse environmental impacts at a lower level.

With regard to the management of batteries and accumulators, the Law on Environmental Protection 2020 establishes extended producer responsibility (EPR) for recycling, collection, and treatment. Accordingly, organizations and individuals that manufacture or import batteries and accumulators are responsible for recycling or collecting and treating products at the end of their life cycle, or for making financial contributions to the Vietnam Environmental Protection Fund if they do not

directly organize recycling or collection and treatment activities. This mechanism aims to ensure that EV batteries are handled in compliance with environmental technical standards.

To mitigate the environmental impacts of EV batteries, Decree No. 08/2022/ND-CP specifies recycling options for rechargeable batteries (used in transport vehicles), including the production of metal ingots or industrial chemicals; recycled plastic pellets and plastic by-products; or export for recycling, although the current recycling rate remains low, at only about 8%.

EV batteries are classified as hazardous waste due to their content of heavy metals and toxic chemicals. Therefore, the recycling and treatment of end-of-life batteries must comply with environmental safety standards, while enterprises are encouraged to develop lithium-ion battery recycling technologies in order to recover critical metals (such as cobalt, nickel, and lithium) for reuse in manufacturing. This approach contributes to the establishment of a circular supply chain.

3.1.3. Tax and fee policies

According to Brückmann, G., Willibald, F., and Blanco, V. (2021), “alternatives to internal combustion engine vehicles are already available on the market, but without broad political support, the uptake of EVs remains low.” Tax policy therefore plays a pivotal role in promoting the development and expansion of EVs in the market, thereby facilitating the transition toward clean-energy vehicles.

Regarding special consumption tax (SCT), the Law on Special Consumption Tax 2008 (as amended and supplemented in 2014) initially prescribed tax rates for electric automobiles ranging from 10% to 25%. In order to fulfill international commitments made at COP26, subsequent amendments to the Law on Special Consumption Tax 2008 (2014, 2022) introduced new preferential policies aimed at reducing emissions and environmental pollution while promoting consumption and attracting both domestic and foreign investment. Specifically, the following SCT rates apply to electric vehicles: 3% for passenger vehicles with up to 9 seats; 2% for passenger vehicles with 10 to 16 seats; and 1% for passenger vehicles with 16 to 24 seats.

Compared with conventional automobiles with fewer than 24 seats (SCT rates ranging from 35% to 150% depending on engine displacement), passenger vehicles with 10 to 16 seats (10%), and dual-purpose vehicles for both passengers and cargo (15%–25% depending on engine displacement), EVs benefit from significantly lower tax rates. However, after the preferential period expires on March 1, 2027, the SCT rates for battery electric vehicles will increase to 11%, 7%, and 4%, respectively.

With respect to corporate income tax (CIT), as analyzed in Section 1.3.1, EV investment projects are eligible for CIT incentives. While the standard CIT rate is 20%, investors receiving investment incentives may enjoy lower tax rates for a fixed or indefinite period during project implementation. Investors operating in preferential investment locations are also entitled to similar incentives. Specifically, new investment projects involving application and investment in high-tech sectors prioritized for development, as well as supporting industrial products for automobile manufacturing and assembly, may be subject to a 10% CIT rate for 15 years, or benefit from tax exemptions for up to four years and a 50% reduction in payable tax for up to nine subsequent years, along with other incentives in accordance with CIT regulations. By contrast, automobile manufacturing and assembly projects are eligible for a 17% tax rate for 10 years, or tax exemptions for up to two years and a 50% reduction for up to four subsequent years.

The Law on Corporate Income Tax 2025, which replaces the Law on Corporate Income Tax 2008 (as amended in 2013), introduces several new provisions, including a 15% tax rate for enterprises with annual total revenue not exceeding VND 3 billion, and a 17% tax rate for enterprises with annual total revenue from over VND 3 billion to not exceeding VND 50 billion. These changes aim to reduce the tax burden and promote the activities of small and medium-sized enterprises. Enterprises may also enjoy tax exemptions for up to two years and reductions for up to four years, which have been applied to specific sectors such as automobile manufacturing and assembly. Overall, the Law on Corporate Income Tax 2025 places greater emphasis on supporting small and medium-sized enterprises while enhancing the quality of tax administration.

With respect to import duties on components, statistics from the General Department of Customs indicate that “in December 2024 alone, imports of automobile components and spare parts of all types amounted to USD 479 million.” As analyzed in Section 1.3.1 regarding EV-related sectors eligible for investment incentives, in order to meet development needs, imported goods used for EV production that qualify for investment incentives are eligible for import duty exemptions on raw materials, supplies, machinery, equipment, components, and knocked-down parts used to form fixed assets (Clause 11, Article 16 of the Law on Export and Import Duties 2016, as amended and supplemented in 2025).

The Government has promulgated import tariff schedules providing preferential treatment for raw materials, supplies, and components used in the production and processing of prioritized supporting industrial products for the automobile sector, with a 0% import duty rate applied until December 31, 2024. In line with the green transition and sustainable development orientation, the Government subsequently issued Decree No. 21/2025/ND-CP, extending the application of the 0% import duty rate until December 31, 2027. In addition, under the preferential tax program for components used in automobile manufacturing and assembly such as batteries and battery packs (HS 9849.43), electric motors (9849.42), time-measuring instruments (9849.39), seats (9849.40), and measuring instruments and devices (9849.37) these items, “classified under Group 98.49 pursuant to Clause 3, Section II, Appendix II,” are subject to a 0% import duty rate.

To qualify for these tax incentives, enterprises must satisfy certain conditions, including minimum overall output and minimum model-specific output requirements, and the use of components classified under Group 98.49. For automobile manufacturing and assembly enterprises, eligibility must be certified by the Ministry of Industry and Trade. For enterprises engaged in the production and processing of components and spare parts, additional requirements apply, such as valid sales contracts for supporting industrial products, investment registration certificates, and the use of raw materials, supplies, and components listed in the Catalogue of Supporting Industrial Products.

In pursuit of green industrial development and investment attraction, Decree No. 199/2025/ND-CP dated July 8, 2025, which amends Decree No. 26/2023/ND-CP, introduced an additional provision (Point c3.6). This provision stipulates that the production of battery electric vehicles, fuel-cell vehicles, and hybrid vehicles may be included in the calculation of both minimum overall output and minimum model-specific output for the purpose of eligibility assessment under the 0% import duty incentive scheme. Accordingly, this provision effectively increases qualifying output volumes and encourages enterprises to shift from gasoline- and diesel-powered vehicles toward environmentally friendly vehicles while remaining eligible for tax incentives.

With regard to non-agricultural land use tax and land rental payments, Clause 1, Article 157 of the Land Law 2024 provides that land used for business purposes falling within the scope of investment incentives is eligible for exemptions or reductions in land use fees and land rental payments. As analyzed in Section 1.3.1 concerning investment-incentivized sectors and locations, the Law on Non-Agricultural Land Use Tax 2010 classifies projects under the "list of specially investment-incentivized sectors," projects located in areas with particularly difficult socio-economic conditions, and investment-incentivized projects in areas with difficult socio-economic conditions as eligible for exemptions from non-agricultural land use tax. For other investment-incentivized projects or projects located in areas with difficult socio-economic conditions, a 50% reduction in payable tax applies.

Regarding the registration fee (pre-registration fee), this is defined as "a fee payable by organizations and individuals upon registering ownership rights with a competent authority." Electric vehicles, classified as "motor vehicles using clean and environmentally friendly energy sources powered by electric motors and participating in road traffic, subject to registration and license plate issuance," fall within the scope of registration fee liability (Clause 7, Article 3 of Decree No. 10/2022/ND-CP, as amended by Decree No. 175/2025/ND-CP). The applicable rate is 0% for the first three years from March 1, 2022, and 50% of the first-time registration fee applicable to gasoline or diesel vehicles of the same seating capacity for the subsequent two years. Recognizing the need to continue this policy to

stimulate business activity and market consumption, the Government issued Decree No. 51/2025/ND-CP, extending the 0% first-time registration fee rate until February 28, 2027. This registration fee incentive policy has significantly boosted EV consumption in the market.

In addition, non-fiscal incentives provided by enterprises have made a significant contribution to the green transport transition in Viet Nam. A notable example is VinFast's charging-station partnership program, which requires zero initial investment. Partners only need to meet VinFast's requirements regarding suitable locations and complete legal documentation, after which VinFast supports the construction, operation, maintenance, and insurance of charging stations. As a result, the nationwide charging network has expanded to approximately 150,000 charging ports. Building on this success, V-Green (spun off from VinFast's charging division) has implemented a franchise model for electric motorcycle battery-swapping cabinets. Under this model, partners receive various enterprise-backed incentives, including guaranteed income during the first five years; investors receive the full battery-swapping fee of VND 9,000 per swap, plus an additional VND 1,250 per swap during the first three years. These non-fiscal policies have accelerated the development of EV charging infrastructure in Viet Nam, serving both as a distinctive corporate growth strategy and as a catalyst for nationwide vehicle electrification.

3.1.4. Technical standards and regulations for electric vehicles

According to Sithara S. G. Acharige et al. (2023), "standardizing charging requirements, infrastructure design, intelligent control strategies, and advanced battery technologies is essential for the successful adoption of electric vehicles."

Regarding technical standards, most EV-related standards in Viet Nam are developed based on two major international standards systems: the International Organization for Standardization (ISO) (e.g., ISO 6469-3:2018 on electrically propelled road vehicles) and the International Electrotechnical Commission (IEC) (e.g., IEC 61851-1:2017 on conductive charging systems for EVs). Vietnamese standards for electrically propelled road vehicles include TCVN 12504-1:2020 on rechargeable energy storage systems, which sets functional safety requirements for batteries,

including overcharging, overheating, fire and explosion risks, and battery degradation incidents; TCVN 12504-2:2020 on operational safety, which specifies requirements for permitted driving modes, parking and reversing, electronic compatibility, and minimum residual electrical capacity sufficient for lighting; TCVN 12504-3:2020, which establishes standards primarily to protect users against electric shock; and TCVN 12504-4:2020, which regulates electrical safety after a certain period following a collision, ensuring that excessive current does not pose hazards and that electrolyte leakage is prevented. In addition, electric motorcycles and mopeds are subject to standards such as TCVN 12776-1:2020 on energy consumption and driving range, and TCVN 12776-2:2020 on on-road performance characteristics.

With regard to technical regulations, electric vehicles (EVs) are classified as "environmentally friendly motor vehicles (FHEVs, full hybrid electric vehicles; MHEVs, mild hybrid electric vehicles, etc.) and vehicles using clean, green, and environmentally friendly energy sources (BEVs, FCEVs, hydrogen-powered vehicles, etc.)." Nevertheless, EVs are not exempt from regulatory responsibilities, and enterprises must comply with requirements on inspection, technical safety quality, and environmental protection in the processes of importation, manufacturing, and assembly prior to market circulation. The Ministry of Transport has promulgated numerous National Technical Regulations (QCVNs) to ensure technical safety and environmental protection standards pursuant to Circular No. 48/2024/TT-BGTVT.

Specifically, these include QCVN 91:2024/BGTVT on batteries used for electric motorcycles and electric mopeds; QCVN 90:2024/BGTVT on motors used for electric motorcycles and electric mopeds; QCVN 09:2024/BGTVT on automobiles; QCVN 109:2024/BGTVT on Level-5 emission standards for newly manufactured and assembled automobiles; and QCVN 122:2024/BGTVT on automobiles and four-wheeled passenger vehicles with engines in technical safety inspections. These regulations fall within the category of products and goods subject to mandatory certification of technical safety quality and environmental protection. In accordance with Clause 1, Article 41 of the Law on Road Traffic Order and Safety 2024, such vehicles must meet technical safety and environmental protection requirements.

Regarding charging infrastructure standards, the standards for conductive charging systems for EVs are divided into multiple parts, each addressing specific technical requirements. For example, TCVN 13078-21-1:2020 specifies electromagnetic compatibility requirements for onboard conductive chargers connected to AC/DC power supplies, including immunity levels against transient disturbances and longitudinal surges; TCVN 13078-23:2020 sets technical standards for DC charging stations for EVs, including the functions of various DC charging modes, disconnection mechanisms, EV connectors, and charging cable assemblies; and TCVN 13078-25:2023 governs DC power supply equipment with electrical separation-based protection, stipulating standards for charging modes and functions, protection against electric shock, conductive interfaces, and adapters.

With regard to EV battery standards, according to Volza statistics, from September 2023 to August 2024, Viet Nam imported 38,723 shipments of lithium batteries, reflecting the fact that lithium batteries have "clear advantages such as long lifespan, high energy density and efficiency, construction from environmentally friendly materials, no toxic gas emissions, and a high level of safety." For this reason, lithium batteries have been tested and developed under dedicated technical standards. Specifically, standards for secondary lithium batteries used for propulsion in electrically powered road transport include TCVN 12241-1:2018, which regulates performance testing such as voltage, energy density, and battery degradation characteristics; TCVN 12241-2:2018, which addresses reliability and abuse testing, requiring resistance to real-world vibration levels, external compression, and ambient temperature conditions; TCVN 12241-3:2018, which sets safety requirements including vibration resistance, external compression, ambient temperature tolerance, and external short-circuit protection; and TCVN 12241-4:2018, which provides alternative methods for internal short-circuit testing.

In addition, given frequent consumer use, standards for swappable batteries at battery-swapping stations for electric motorcycles and mopeds have been promulgated under TCVN 13916:2024. These standards require compliance with specifications on capacity, cycle life, capacity degradation, thermal stability, and

safety requirements (including fire resistance, water immersion, and over-discharge protection).

4. China's experience and comparison with Viet Nam

4.1. Similarities in the transition processes of Viet Nam and China

First, in terms of policy orientation, both countries have set objectives to develop clean-energy vehicles within their national strategies. China has promulgated the "New Energy Vehicle Industry Development Plan 2021–2035" (State Council, Document No. 39/2020), while Viet Nam issued Decision No. 876/QD-TTg dated July 22, 2022 of the Prime Minister approving the "Action Program for Green Energy Transition and Carbon Emission Reduction in the Transport Sector." Both documents reflect a comprehensive approach to vehicle transition based on technological advancement, institutional frameworks, and high-quality human resources.

Second, in terms of legal and policy instruments, both countries adopt investment incentives, tax and fee reductions/exemptions, and registration-fee incentives, while simultaneously promoting the development of charging infrastructure and the battery supply chain. In China, NEV tax policies include "an exemption from vehicle purchase tax for new energy vehicles until December 31, 2025, and a 50% reduction from January 1, 2026 to December 31, 2027," as well as "exemptions or reductions of vehicle and vessel tax." Viet Nam has also adopted similar measures, such as a 0% registration fee, import-duty exemptions, and VAT reductions, as analyzed in detail in Section 3.1.3.

Third, regarding low-emission zones (LEZs), both countries focus on establishing LEZs in areas with high pollution levels—typically city centers—and then expanding them over time toward suburban and rural areas. In Viet Nam, the first phase concentrates on establishing LEZs in two major cities, Hanoi and Ho Chi Minh City, which have the highest emissions levels nationwide, by delineating ring-based zones and gradually extending restrictions to larger rings according to fixed timelines. In China, pilot cities such as Beijing, Shanghai, and Guangzhou introduced LEZs that restrict the circulation rights of gasoline vehicles in central urban areas.

4.2. Differences in the transition processes of Viet Nam and China

Although both countries share a green-transition orientation, differences in scale, the degree of legal coerciveness, and enforcement effectiveness have produced clear divergences between Viet Nam and China, as follows:

First, regarding the level of legal intervention, China employs strongly binding legal mechanisms with quantitative requirements. Examples include the "dual-credit policy," which compels automakers to "simultaneously meet a minimum NEV ratio (28% in 2024; 38% in 2025) and progressively stricter Corporate Average Fuel Consumption (CAFC) targets"; the vehicle licensing quota policy, under which "100,000 license plates are issued, of which NEVs account for 60,000, increasing to 80,000"; and the nationwide implementation of the National Emission Standard VI, Phase 6b from July 1, 2023, which prohibits the production/import/sale of non-compliant vehicles. In addition, to distinguish EVs from gasoline vehicles, China applies green license plates for NEVs. By contrast, Viet Nam does not yet have comparable legal instruments and remains largely at the stage of encouraging voluntary uptake through tax incentives and general development orientations.

Second, regarding support and development-promotion policies, beyond tax and fee incentives, China has issued a wide range of support measures targeting both enterprises and consumers to accelerate the transition. These include policies such as Notice No. 718/2024 on promoting large-scale pilot programs for vehicle-to-grid (V2G) interaction to integrate transport and energy systems; policies providing free grid-capacity access before 2030, reductions or exemptions of land-rental fees for charging points by phase, and priority for grid companies in developing charging infrastructure in terms of grid access and capacity expansion; as well as direct purchase subsidies, under which "NEVs meeting eligibility criteria receive subsidies of 3,000 RMB/kWh; plug-in hybrid passenger vehicles receive subsidies of up to 50,000 RMB per vehicle, while battery electric vehicles receive subsidies of up to 60,000 RMB per vehicle."

By contrast, Viet Nam is still in the process of formulating similar policies. For example, the Draft Resolution on Green Vehicle Transition and Charging

Infrastructure Development in Hanoi discusses support measures for charging-station investment, land access, and financial assistance for residents. Likewise, the Emission Control Scheme for Ho Chi Minh City, discussed on October 7, 2025, addresses the establishment of low-emission zones, support policies, and vehicle electrification.

Third, with respect to technical standards and regulations, China has promulgated 95 national technical standards related to the EV sector, covering the entire value chain—from EV safety (GB 18384-2020), battery-swapping safety (GB/T 40032-2021), conductive charging system safety (GB 44263-2024), to charging connectors (GB/T 20234-2023). As a result, EV products and charging infrastructure are highly standardized and interoperable, significantly reducing risks related to quality and operational safety. In contrast, Viet Nam's technical standards system remains relatively limited and is still under development. For instance, the national technical regulation on EV charging poles (QCVN xx:2025/BKHCN) is still in draft form and has not yet been officially promulgated. Moreover, several important regulatory frameworks are still lacking, such as standards on EV battery safety, electric motors and power systems, and battery-swapping stations, which are necessary to impose binding obligations on manufacturers and investors.

Fourth, regarding technology and infrastructure, China has developed a network of 14.4 million charging points as of May 2025 (according to statistics from the China Electric Vehicle Charging Infrastructure Promotion Alliance), together with a wide range of technologies such as battery swapping for cars and electric motorcycles, ultra-fast charging, and vehicle-to-grid (V2G) systems. These developments have helped alleviate "range anxiety" and stimulate market demand. In addition, according to the IEA, the total number of EVs (BEVs and PHEVs) on China's market reached 11.3 million vehicles in 2024. BloombergNEF likewise reports that China ranked first in the global lithium-ion battery supply chain in 2024, with EV sales reaching 11.3 million units, the highest worldwide. These figures demonstrate China's leading technological and industrial position in the global EV sector.

By contrast, Viet Nam has only begun to establish charging infrastructure on a pilot basis, primarily through enterprise-led investments such as those by VinFast. The

country still lacks unified technical standards for charging capacity, safety, and grid connectivity; remains dependent on imported components and parts; and continues to rely heavily on imported technologies and raw materials for EV battery and electric motor production.

Fifth, regarding consumer protection, Chinese law imposes specific obligations on NEV manufacturers and distributors concerning warranty periods and repair, replacement, and refund mechanisms. These include a warranty of two years or 50,000 kilometers (whichever comes first); the consumer's right to choose repair facilities during the warranty period; and mandatory replacement of key components (such as motors and batteries/gearboxes) in the event of quality defects. In cases of serious defects within 60 days (e.g., steering or braking system failures, body cracks, leakage, or battery fires due to quality defects), or where major assemblies must be replaced within seven days, consumers are entitled to vehicle replacement or refunds. If repairs exceed five days, the repair provider must supply a replacement vehicle or compensation. Manufacturers must respond within 10 working days and complete replacement or refund procedures within 20 days.

In Viet Nam, consumer protection is governed by the Law on Consumer Protection 2023 and the Law on Product and Goods Quality 2007, which establish general obligations regarding warranty, customer response, recalls, and compensation. However, these laws do not yet provide EV-specific consumer protection standards.

Sixth, regarding battery recycling and cascade utilization, China issued the Joint Notice of the Ministry of Industry and Information Technology [2021] No. 114 on "Administrative Measures for the Cascade Utilization of Power Batteries for New Energy Vehicles," which assigns roles and promotes value-chain linkages. Specifically, recycling enterprises are required to prioritize the recovery of end-of-life batteries (Article 6) and are encouraged to enter into agreements with NEV manufacturers and battery producers to organize recycling and reuse activities. As a result, a large-scale battery treatment market has emerged, creating investment incentives and standardizing technical processes.

By contrast, Viet Nam currently regulates extended producer responsibility in general terms but lacks EV-specific standards for power batteries, such as thresholds for battery state-of-health to enable second-life use, safety inspection procedures for dismantling, transport, and storage, criteria for traceability of recovered materials, and a unified network of collection points.

4.3. Legal gaps and implications for Viet Nam

For the green transition to be effectively implemented, Viet Nam's legal system still requires amendments and supplements to the legal framework governing the EV sector. The legal and technological gaps can be summarized as follows.

Gaps in policy and institutional mechanisms. Viet Nam lacks a dedicated Law or Decree specifically regulating the EV industry. Legal fragmentation creates difficulties in coordination among ministries and state agencies; there is no unified standard for charging safety, interoperability, and charging-station data governance; incentive–constraint policies remain weak and insufficient to generate strong transition momentum; and the institutional design for inter-sectoral coordination as well as monitoring and evaluation (M&E) mechanisms remains underdeveloped.

Gaps in enforcement mechanisms. China applies annual inspection regimes, public disclosure of credit scores, and sanctions for violations, whereas Viet Nam is still at the stage of developing vehicle emission statistics and reporting systems, without mandatory enforcement tools targeting old gasoline vehicles or those failing to meet environmental standards.

Accordingly, China has entered a phase of market regulation and control, treating gasoline-vehicle restrictions as the outcome of a comprehensive set of economic and legal policies. Viet Nam, by contrast, remains in the early stage of vehicle transition and therefore needs to promptly codify existing incentive policies, while gradually establishing quantitative binding mechanisms (such as carbon credits and NEV quotas) to create stronger incentives for shifting toward green vehicles.

5. Proposed solutions to improve the roadmap for restricting gasoline vehicles in Viet Nam

5.1. Conditional tax–fee incentives and a phased roadmap

To avoid policy gaps when incentives expire or market stagnation caused by abrupt termination of tax incentives, the State should adopt a strategy of extending incentives and gradually tapering them over time. A phased reduction of incentives once EV adoption reaches certain thresholds—rather than sudden cuts—would allow markets to adjust smoothly and maintain motivation for both enterprises and consumers.

Incentive policies should be conditional, linked to performance, safety, and battery recycling criteria. Only vehicle models meeting minimum requirements on driving range, maximum electricity consumption, minimum battery warranty periods, compliance with safety standards, and having approved collection–recycling plans with material recovery targets should be eligible for tax, fee, or credit incentives. Enterprises failing to maintain compliance should face withdrawal or claw-back of incentives. This "conditional incentive" mechanism encourages substantive innovation, as demonstrated by China's experience.

At the same time, taxes and fees on gasoline vehicles should be increased progressively—such as higher special consumption tax, registration fees, and environmental taxes—to internalize environmental externalities and steer consumers toward EVs. In parallel, non-financial incentives should be expanded, including toll exemptions, free parking in fee-based areas for a defined period (e.g., until the end of 2027, with possible extensions), thereby creating real-world usage advantages for EVs while preserving voluntary consumer choice.

5.2. Legal solutions on technical standards and regulations

Viet Nam's current advantage lies in having national standards harmonized with ISO and IEC standards, reducing development time while ensuring accuracy, quality control, and international compatibility. In addition, Chinese standards and regulations can be studied and selectively internalized based on Viet Nam's specific conditions.

It is essential to promptly promulgate a core national technical regulation on EV charging poles (currently under draft by the Ministry of Science and Technology). This regulation should impose mandatory requirements on electrical safety, fire prevention, and technical interoperability for all charging stations before operation. Such a framework is a prerequisite for eliminating localized monopolies, reducing transaction costs, and enabling consumers to charge across different networks through standardized connectors and data governance. In parallel, additional sector-specific QCVNs should be developed, including regulations on EV lithium battery safety, electric motors and onboard electrical systems, and battery-swapping stations.

5.3. Legal solutions on support policies for enterprises and consumers

The State should introduce policies to support investment costs or subsidize loan interest rates for enterprises engaged in EV manufacturing and charging infrastructure development, subject to compliance conditions. For example, the Hanoi draft proposes covering up to 70% of loan interest for five years for charging-station investors. A green transition support fund drawing on the state budget and international sources could finance EV research and production projects, with a focus on small and medium-sized enterprises to avoid excessive concentration of benefits among large firms.

For consumers, direct financial support should be introduced to encourage EV purchases. Partial or full subsidies could be provided depending on household circumstances, as reflected in draft proposals of VND 3–5 million per electric motorcycle in Hanoi or VND 10–20 million per electric car in Ho Chi Minh City. Such measures would reduce financial burdens and mobilize hesitant consumer groups. In addition, a regulated “scrap-and-replace” program should be implemented, allowing consumers to trade in old gasoline vehicles for EVs at preferential prices, with subsidy levels based on vehicle condition and emission levels. This program should be administered under strict regulatory supervision to prevent price manipulation and loss of public trust.

5.4. Legal solutions on management and supervision of safety and technical standards

The State should clearly designate a lead agency responsible for coordination and establish an empowered inter-agency coordination mechanism, accompanied by publicly disclosed annual M&E indicators such as charging coverage, safety incident rates, battery collection and recycling rates, EV production and market share, and regional emission reductions.

Legal provisions should also require periodic inspections and safety assessments for EVs and charging stations. Beyond routine technical checks, inspections should include battery condition and high-voltage systems to detect risks (e.g., excessive battery degradation or electrical leakage). For charging stations, licensing and pre-operation inspections should be mandatory: only chargers compliant with QCVNs may be operated, with regular safety and fire inspections at public charging sites.

Battery collection and recycling deserve particular attention. Although environmental law already assigns producers responsibility for end-of-life battery recovery, effective implementation requires enhanced supervision and dedicated regulations governing storage, transport, and treatment of EV batteries. The State should encourage domestic battery recycling facilities through investment incentives or tax benefits to reduce external dependence and proactively control pollution from battery waste.

5.5. Legal solutions for establishing low-emission zones

Clear zoning criteria should be developed based on data such as air quality, traffic density, and sensitive areas. Proportionality and fairness should be ensured through activation conditions: restrictions should apply or expand only when public transport capacity and charging infrastructure coverage reach minimum thresholds; conditional exemptions should be granted for essential services and vulnerable groups; and complaint and periodic review mechanisms should be established.

For enforcement, a unified framework is needed for signage, license plate and inspection identification, automated penalties, and data interoperability among traffic police, inspection agencies, and tax authorities. Periodic disclosure of M&E indicators (emission reductions, modal shifts, social costs) is also essential. China's experience shows that effectiveness arises from linking urban restrictions (low-

emission zones) with national-level tools (input emission standards and annual compliance obligations for manufacturers), creating “dual pressure” in both the vehicle circulation market and the new-vehicle market—an approach Viet Nam can adapt by standardizing authority, procedures, data criteria, and sanction mechanisms.

5.6. Other legal solutions supporting gasoline-vehicle restrictions

In public procurement, legal policy should shift from merely purchasing EVs to outcome-based service contracts, with award criteria based on total life-cycle costs (purchase, operation, maintenance, battery replacement, end-of-life treatment). Tender requirements should include standardized interoperability (connectors, protocols, metering and payment), battery safety and fire prevention, recovery and recycling obligations with material recovery targets, and data protection during charging and payment. To ensure competition and avoid technological lock-in, tender documents should emphasize performance outcomes, open compatibility requirements, anonymized operational data sharing with regulators, and provisions for technological upgrades throughout the contract lifecycle.

In addition, the State should strengthen nationwide communication campaigns across all platforms (VTV, VOV, etc.), encourage participation from influential digital media actors, and ensure broad dissemination of transparent information on EV benefits and incentive policies. Public outreach should target groups with limited access to technology, highlighting lower operating costs, safety, and environmental benefits of EVs.

6. Conclusion

EV incentive policies play a crucial role in accelerating the green transport transition and serve as effective instruments for implementing a gasoline-vehicle restriction roadmap aimed at improving air quality and achieving the Net Zero 2050 target. Comparative analysis allows valuable lessons from China to be distilled and adapted for Viet Nam. Nevertheless, practical realities show that Viet Nam remains in a formative stage of legal development and must exert substantial effort to meet current transition demands. This study proposes a set of solutions to enhance the credibility and effectiveness of legal implementation, with the expectation that it will

contribute to the completion of the legal framework and the development of a comprehensive and appropriate roadmap for restricting gasoline vehicles in Viet Nam.

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