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Contents

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Global South Center for Clean Transportation at UC Davis

Driving equitable, science-based transitions in energy and mobility

The **Global South Center for Clean Transportation** at the UC Davis Institute of Transportation Studies (ITS-Davis) supports advancement of clean transportation and energy transitions in developing countries. The center has a cross-cutting research portfolio across South Asia, Africa and Latin America, with strategic country-level programs in India, Mexico, Brazil, Indonesia and Kenya. It leverages ITS-Davis's global leadership in science-based, policy-driven solutions to strategically collaborate with state and national governments, NGOs, and industry, to promote zero-emission transportation policy including clean energy supply chains. The center serves as the founding member and secretariat of the Council for Critical Minerals Development in the Global South and the California-Africa Climate and Economic Partnership.

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Letter from the Editor

The world is preparing once again to gather in November around climate ambition, implementation, finance, and the diplomatic verbs that have become familiar at COP meetings: accelerate, mobilize, enable, deliver. These words help us build the big picture. But transportation is not abstract. It is a bus arriving on time, a delivery person making a living, a truck crossing a border, a student getting to class, a family breathing cleaner air.

And now we are trying to change how this vast, everyday system is powered.

The transition to electric mobility is not simply technological. Transportation is not a single sector with a single pathway. It involves a confluence of resources so that buses can charge overnight in Bogotá, an auto mechanic can be retrained to work with batteries in Mexico, and a small operator in Kenya can finance a new vehicle.

That is the focus of this issue of Majority Mobility: Clean Mobility Pathways for Emerging Economies. Emerging economies are not waiting to have the route taken by wealthier countries handed down to them. They are actively building their own versions of the transition, shaped by the vehicles people use, the industries they hope to strengthen, and the resources and infrastructure available to them.

With COP31 approaching, this issue is our attempt to bring these perspectives into the transport decarbonization conversation. We look at policies that can move EV markets beyond early adoption, strategies for different vehicle segments, new approaches to financing, the role of industrial policy, and the difficult work of turning climate commitments into measurable emissions reductions.

As geopolitical polarization grows and the global information environment is making consensus harder to build, forums that bring us together like COP are crucial. We realize there is no universal roadmap, but by connecting global ambitions with the realities on the ground, climate goals stop being abstract and progress starts becoming real.

I invite you to read, engage, and continue building this conversation with us.

—Francisco A. Parés Olguín
Editor, *Majority Mobility*
Deputy Director,
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Residual Value Guarantees: Alternative Incentives to Unlock the Financing of Electric Trucks

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Note: This article draws on the 2025 International Transport Forum (ITF) report *Financing the Electrification of Heavy-Duty Vehicles* and the forthcoming paper *Financing Road Freight Electrification: Modeling the Total Cost of Ownership of Battery-Electric Trucks under Residual Value and Interest Rate Uncertainties*. Readers seeking full methodological details and results should consult both sources directly.

Introduction

Transport is one of the largest sources of greenhouse gas (GHG) emissions worldwide, and across much of the Global South it is the principal producer of energy-related emissions. For example, in Colombia, the transportation sector generated nearly 46% of energy-related emissions and about 15% of the national inventory[1] in 2021, while in Mexico, motor transportation was the largest category in the 2022 national inventory, contributing 23.7% of total GHG emissions, followed by electricity generation at 18.0%.[2] In India, where power generation dominates energy-

[1] Ministerio de Ambiente y Desarrollo Sostenible de Colombia; Instituto de Hidrología, Meteorología y Estudios Ambientales (IDEAM). (2024) “Inventario Nacional de Gases de Efecto Invernadero de Colombia 1990-2021.” Datos Abiertos Colombia. https://www.datos.gov.co/Ambiente-y-Desarrollo-Sostenible/Inventario-Nacional-Gases-Efecto-Invernadero/6rff-a5ep/about_data

[2] Gobierno de México. (2025) “First Biennial Transparency Report under the Paris Agreement: Executive Summary.” United Nations Framework Convention on Climate Change (UNFCCC). https://unfccc.int/sites/default/files/resource/IBT1_libro_29ENE2025.pdf

related emissions, medium- and heavy-duty trucks represent about 2% of the vehicles on the road yet produce roughly 50% of road transport emissions.[3]

Electrification has emerged as a viable decarbonization pathway for road transport, and its adoption is no longer exclusive to developed economies. Battery-electric technologies are commercially available for motorcycles, passenger cars, urban buses, and light-duty freight vehicles. Electric buses reached 98% of urban bus sales in China in 2024, while Latin American sales grew from around 600 units in 2020 to more than 2,000 in 2024.[4][5][6] Predictable routes and known duty cycles reduced much of the operational uncertainty for urban buses. In emerging economies, public transport authorities supported by concessional finance assumed much of the technical and financial risk, thereby encouraging operators to adopt electric vehicles.

These enabling conditions are less readily available for long-haul trucking, where high upfront costs and more demanding operating requirements have slowed electrification. The price premium relative to comparable diesel trucks, driven largely by the battery capacity required for long-distance operations, is among the constraints that have kept this segment behind in electrification.[7] Global electric truck sales reached approximately 90,000 units in 2024 (an increase of about 80% year over year). Yet, even in China, the most advanced market, battery-electric trucks (BETs) accounted for less than 5% of total new truck sales.[8] Nevertheless, battery-electric powertrains are widely considered the most viable zero-emission option for trucks because renewable electricity faces fewer resource and supply-chain constraints than hydrogen and biofuels.[9]

Financing, not just vehicle price

The total cost of ownership (TCO) aggregates every cost an operator incurs over a vehicle's holding period, combining capital expenditures (CAPEX), such as vehicle purchase, with operating expenditures (OPEX), including energy, maintenance, tolls, and operational taxes. TCO parity with diesel is a necessary condition for broad market competitiveness, and most studies identify the CAPEX gap as the main obstacle to accelerating truck electrification.[10]

Developed economies with large truck markets have committed substantial incentives to close the CAPEX gap, but electrification is still slow. Germany committed EUR 1.2 billion to a commercial vehicle program covering up to 80% of the additional cost of a zero-emission truck,[11] and California's Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project has allocated more than USD 1.7 billion since 2009.[12] China has paired purchase incentives with a national vehicle scrappage scheme.[13] Deployment, however, has remained below the scale needed for broad market transformation.

[3] Asian Transport Observatory (ATO). (2026) "India Transport and Climate Profile." ATO. https://asiantransportobservatory.org/analytical-outputs/transportclimateprofiles/india-transport-and-climate-profile-2026/

[4] Transport & Environment (T&E). (2025) "Half of new EU city buses were zero-emission in 2024." T&E. https://www.transportenvironment.org/articles/half-of-new-eu-city-buses-were-zero-emission-in-2024

[5] International Energy Agency (IEA). (2025) "Global EV Outlook 2025: Expanding sales in diverse markets." IEA. https://www.iea.org/reports/global-ev-outlook-2025

[6] Mao S, Rodríguez F. (2025) "Zero-emission medium- and heavy-duty vehicle market in China, 2024." International Council on Clean Transportation (ICCT). https://theicct.org/publication/ze-mhdv-market-china-2024-mar25/

[7] International Transport Forum (ITF). (2025) "Financing the Electrification of Heavy-Duty Vehicles." Organisation for Economic Co-operation and Development (OECD)/ITF. https://www.itf-oecd.org/financing-heavy-duty-vehicle-electrification

[8] Same as 5 above.

[9] International Transport Forum (ITF). (2023) "How governments can bring low-emission trucks to our roads — and fast." ITF Policy Brief No. 127. OECD/ITF. https://doi.org/10.1787/80680242-en

[10] Same as 7 above.

[11] Mottschall M, Hacker F, Weber M, Plötz P, Speth D, Rao S, Götte S, Ludewig Y. (2025) "Abschlussbericht zur Evaluation des Förderprogramms für klimaschonende Nutzfahrzeuge und Infrastruktur nach der KsNI-Richtlinie." Öko-Institut, Fraunhofer Institute for Systems and Innovation Research (Fraunhofer ISI), and aproxima. https://www.oeko.de/publikation/abschlussbericht-zur-evaluation-des-foerderprogramms-fuer-klimaschonende-nutzfahrzeuge-und-infrastruktur-nach-der-ksni-richtlinie/

[12] California Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP). (2026) "Incentives for Clean Trucks and Buses." California HVIP. https://californiahvip.org/

[13] Mao S, Zhang Y, Bieker G, Rodríguez F. (2023) "Zero-emission bus and truck market in China: A 2021 update." International Council on Clean Transportation (ICCT). https://theicct.org/publication/china-hvs-ze-bus-truck-market-2021-jan23/

Beyond the vehicle price gap, a first financing challenge is access to affordable finance. Unlike urban buses, trucking is financed through private loans from commercial banks, which lend at accessible rates only when the risk is acceptable. BETs can raise three questions for a bank that a diesel truck does not: (i) whether BETs perform reliably under current operational conditions; (ii) whether the BETs' operations will generate sufficient revenue for the borrower to service the loan; and (iii) whether BETs' residual value provides enough collateral to recover part of the loan in a default. When the answers remain uncertain, banks raise the interest rate,[14] delaying TCO parity and therefore electrification (see Figure 1).

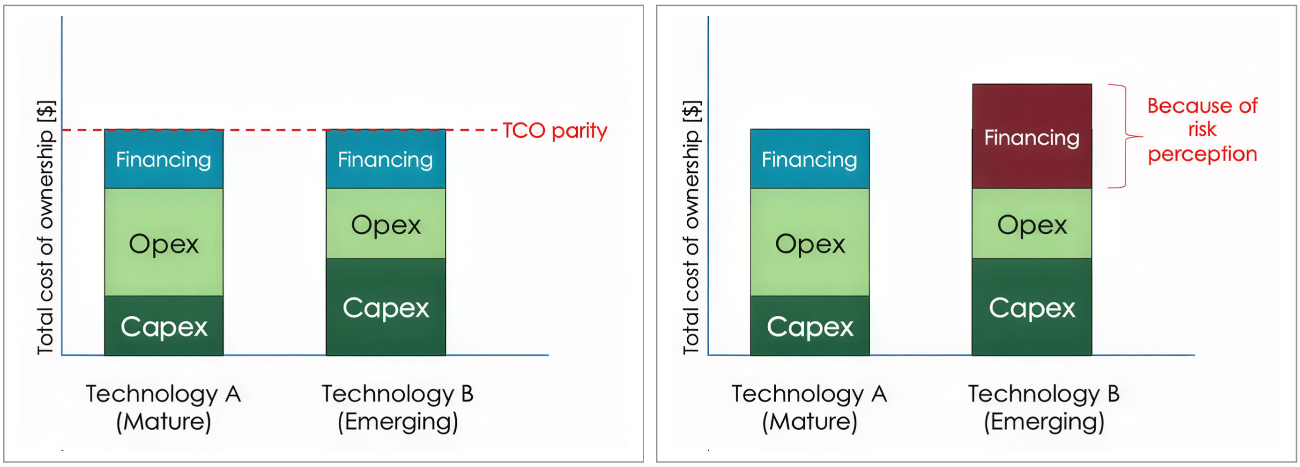

Figure 1. Risk perception and TCO parity under similar (left) and risky (right) financing conditions.

A second financing challenge stems from the structure of the trucking industry. Small and medium-sized enterprises (SMEs) operate the truck fleets in most regions. In Latin America and the Caribbean, micro and small companies account for roughly 97% of freight service providers. In Mexico, the small owner-operator remains the most common business structure for trucks.[15] SMEs have the weakest access to commercial credit, operate on thin margins, and face proportionately greater technology risk with a single electric truck than with a fleet of fifty units. Banks also assess SMEs as riskier borrowers, further raising their interest rates.[16] Figure 2 shows expected rates rising across emerging economies relative to diesel vehicles, with the gap widening for SMEs.

Residual value guarantee as an incentive to reduce risk

BETs are still emerging technologies, and because there is no established second-hand market, their residual value--the amount an owner recovers at resale--is uncertain. Residual value plays a double role: operators book it as income when planning resale, directly impacting TCO; and banks treat it as collateral to reduce their exposure in a default. Without trustworthy estimates, commercial banks take a conservative position and may assign a residual value of zero,[17] making the transaction riskier and raising the interest rate. Because this issue has received limited attention, our recent International Transport Forum (ITF) report and forthcoming manuscript examine how residual value affects TCO and how residual value guarantees (RVGs) could accelerate electrification.[18,19]

An RVG establishes a public floor under residual value. It does not oblige a government to buy used vehicles; it assures financing institutions that a well-maintained BET will retain at least a defined share of its purchase price, fixed when the loan is signed. The premise is that the residual value of a used BET is more than zero, since even a

14 International Transport Forum (ITF). (2025) "Financing the Electrification of Heavy-Duty Vehicles." OECD/ITF. https://www.itf-oecd.org/financing-heavy-duty-vehicle-electrification

15 Same as 14 above.

16 Same as 14 above.

17 Same as 14 above.

18 Same as 14 above.

19 Lopez JC, Kopf A, Craglia M, Jaller M. (forthcoming) Financing Road Freight Electrification: Modeling the Total Cost of Ownership of Battery-Electric Trucks under Residual Value and Interest Rate Uncertainties. Forthcoming manuscript.

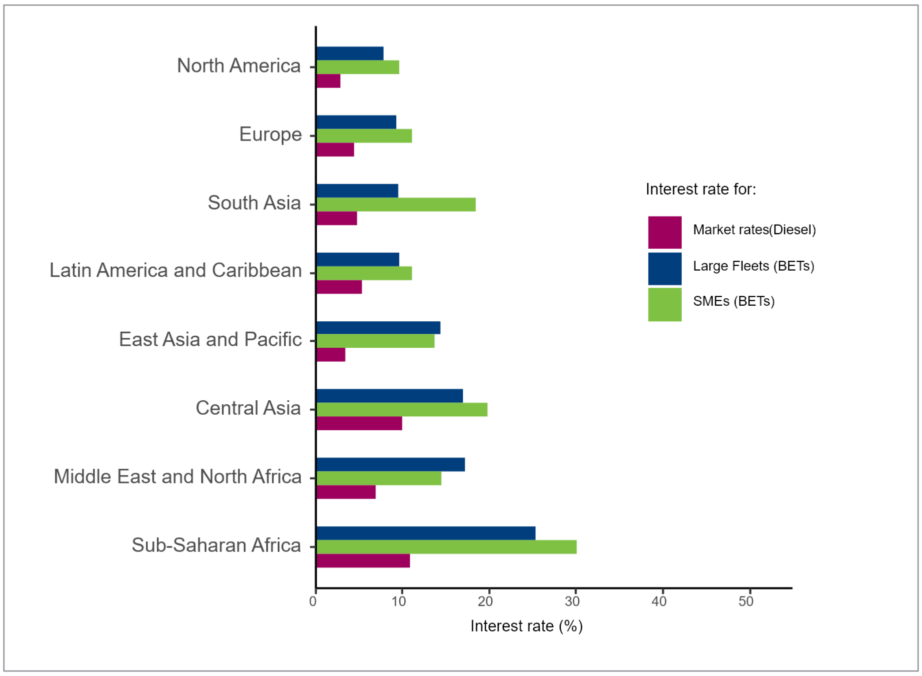

Figure 2. Expected interest rates for diesel trucks and BETs by region and company size.
Note: Rates estimated using region-typical risk assessments. Conservative bank positioning raises them further.

vehicle sold for parts retains the material value of its battery and components.[20] If the resale price at the end of the ownership period, typically five to seven years for a large truck,[21] falls below the guaranteed level, the government covers the difference. RVGs are meant to be temporary, so once resale data accumulate, lenders can price the technology through their own risk analysis.

Figure 3 illustrates how a purchase subsidy and an RVG affect the risk banks perceive and the TCO owners face. The figure also shows why RVGs are useful but limited: they reduce financing uncertainty but do not close the purchase-price gap between technologies. High RVGs would also increase fiscal risk, depending on uptake, eligibility rules, administrative controls, and the difference between guaranteed and actual resale prices. RVGs should therefore be initially anchored to the benchmark resale value of diesel trucks (usually 25% to 30% of the purchase price after five years[22]).

Combining RVGs with purchase subsidies can be a cost-effective way for governments to accelerate electrification because these instruments close two different gaps: the subsidy reduces the purchase-price gap, while the RVG reduces uncertainty in financing. Our study shows that a 30% subsidy paired with a 25% RVG (both percentages are expressed as shares of the BET's initial purchase price) can accelerate TCO parity at lower public cost than a 50% purchase subsidy alone.[23,24]

For emerging economies, an RVG offers a way to increase certainty quickly, although it requires strong governance to limit the leakage of public funds. The design must be developed with fleet operators and financing institutions so it can reach not only large companies but also SMEs, with international development banks contributing experience and low-cost funds. Leasing models, such as trucking-as-a-service and pay-as-you-drive, should also be encouraged alongside the RVG because they aggregate demand, accelerate economies of scale, and give small operators a financing structure matched to how they earn.[25] These instruments do not work in isolation. Charging infrastructure has to advance in parallel, and the broader policy framework must also cover operating

20 Nadkarni K. (2024) "Financing Fleet Electrification: Battery-Electric Truck Component Resale Highlights Residual Value Upside." CALSTART. https://calstart.org/bet-component-residual-values/

21 International Transport Forum (ITF). (2025) "Financing the Electrification of Heavy-Duty Vehicles." OECD/ITF. https://www.itf-oecd.org/financing-heavy-duty-vehicle-electrification

22 Same as 21 above.

23 Same as 21 above.

24 Lopez JC, Kopf A, Craglia M, Jaller M. (forthcoming) Financing Road Freight Electrification: Modeling the Total Cost of Ownership of Battery-Electric Trucks under Residual Value and Interest Rate Uncertainties. Forthcoming manuscript.

25 Same as 21 above.

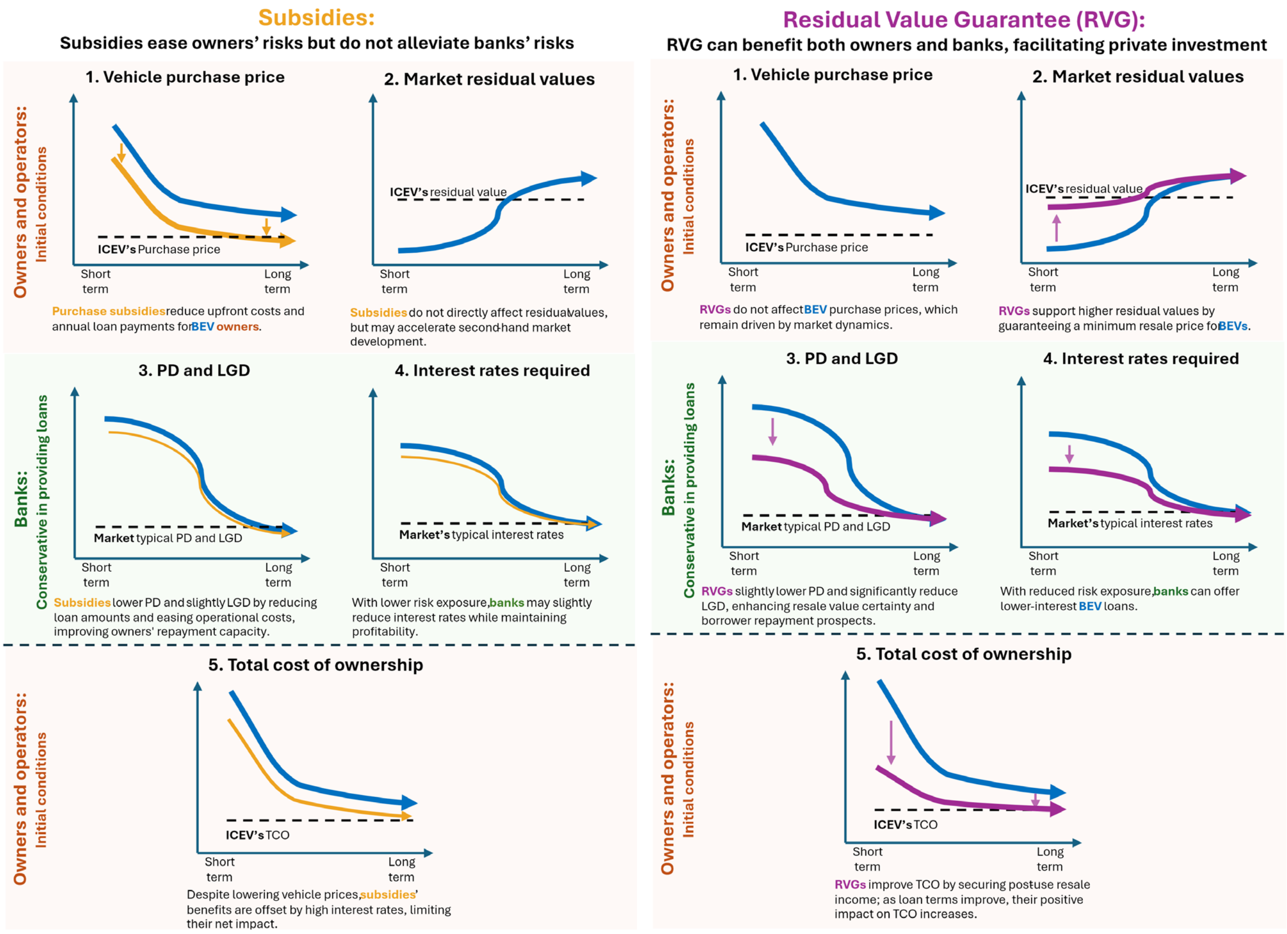

Figure 3. Risk evolution for owners and banks with subsidies (left) and residual value guarantees (RVGs; right). PD = probability of default; LGD = loss given default.

conditions, including taxes and registration fees. Emerging economies do not have to wait for the price of BETs to fall on its own, nor match the subsidy budgets of developed economies for the business case to work. A credible floor under residual value, a smaller purchase subsidy alongside it, and leasing structures that open the market to small operators would push TCO parity earlier while building the second-hand market that makes the RVG unnecessary.

Different Countries, Different Transition Pathways: The Next Billion Electric Trips in the Global South

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The future of transport decarbonization may not arrive through cars for the majority of people living in the Global South. It may arrive on an e-motorcycle taxi through Nairobi traffic, an electric bike through Delhi, a battery-swapped motorbike in Kigali, or electric scooters navigating the dense streets of Hanoi.

Globally, electric two- and three-wheelers are already the most electrified road-transport segment. In 2025, about 11 million electric two- and three-wheelers were sold worldwide, reaching a 15% sales share. Electric two-wheelers alone accounted for almost 10 million sales; most were concentrated in Asia, especially China, India, and Viet Nam, while Africa reached about 70,000 sales after rapid growth from a very small base.

Across the Global South, these modes enable billions of trips every year. They often serve neighborhoods and corridors where conventional public transport is unavailable, infrequent, or too expensive to operate. By moving people to jobs, schools, health services, and markets - and by supporting delivery, ride-hailing, and taxi work - they function as both a mobility system and a source of livelihoods.

Electric two- and three-wheeler services have evolved organically in response to affordability constraints, fragmented urban growth, and unmet mobility demand. Their defining characteristic is adaptability. Depending on the local market, they may operate as fixed-route services, demand-responsive taxis, ride-hailing vehicles, app-based delivery fleets, or urban freight carriers. Their fares, routes, ownership models, and operating schedules can be adapted to different users and geographies, helping them remain affordable for both riders and operators. As cities continue to expand, these modes are likely to become even more important for equitable access and urban resilience.

Evidence from emerging markets shows that two-wheeler electrification does not follow a single pathway. Countries share the same goal of decarbonizing transport, but the transition is shaped by product design, use cases, fuel economics, industrial policy, and financing. This makes two-wheeler electrification one of the most consequential - and distinctive - parts of transport decarbonization in the Global South.

India: policy created demand signal, product development created scale

India has traditionally been a larger market for motorcycles than scooters, but its early two-wheeler electrification has been led by scooters. India's early national policy support began with FAME-I (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles), launched in 2015 to promote electric and hybrid vehicles through demand incentives, market creation, and related support measures. Around the same time, India's e-commerce market expanded rapidly,[1] increasing the need for demand-responsive delivery services. The strongest product-market fit emerged in low-speed electric scooters that were relatively inexpensive, easy to service, and well suited to narrow urban lanes. Because these scooters had lower upfront costs and could be used intensively in delivery and other demand-responsive services, their total cost of ownership was more favorable than that of electric motorcycles. In FY 2020, scooters accounted for around 90% of reported electric two-wheeler sales in the country.

The next phase, FAME-II, responded to this growing market by targeting demand incentives toward electric two-wheelers and other priority EV segments. Since 2021, the market has expanded rapidly as manufacturers have introduced higher-performing, more competitive scooter models with lithium-ion batteries. By FY 2025, India sold 1.15 million electric two-wheelers, growing 21% year on year since 2021. Policy support and product development together have helped drive product innovation, price competitiveness, and scale. Today, several electric motorcycles in India offer performance closer to internal combustion engine (ICE) motorcycles, with range-price combinations comparable to electric two-wheelers in other major Global South markets (see Figure 1).

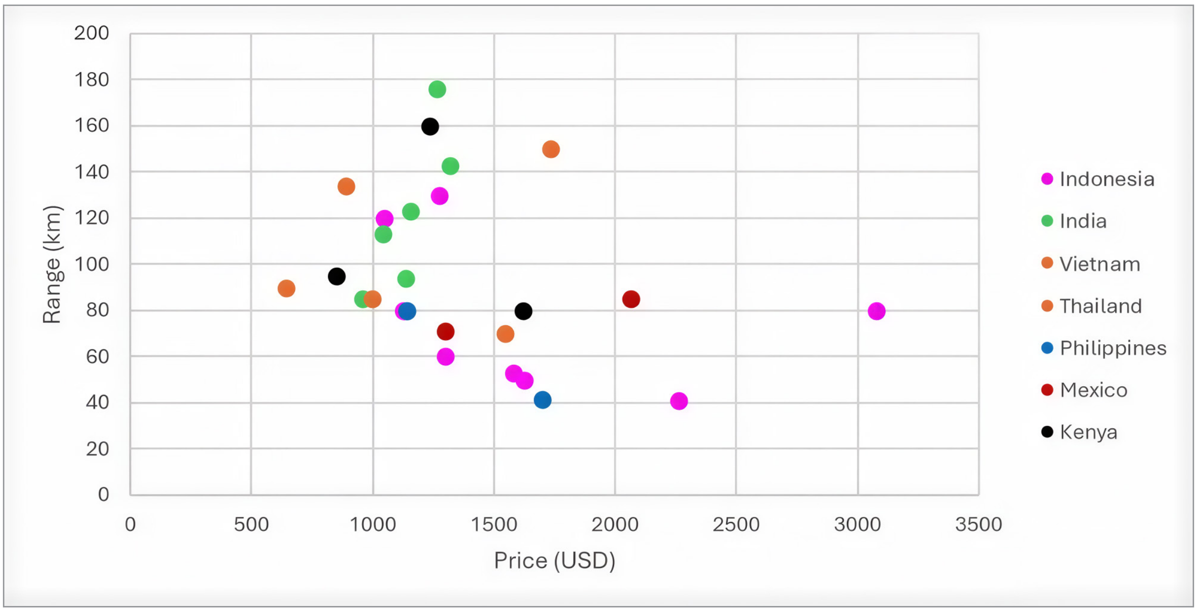

Figure 1. Range-price positioning of electric two-wheeler models in selected Global South markets

[1] Bhandari L, Raj J, Gupta A, Tiwari I. (2026) "India E-Commerce Report 2026: Innovation in the Merchandise Space." Centre fo Social and Economic Progress. https://csep.org/reports/india-e-commerce-report-2026-innovation-in-the-merchandise-space/

Vietnam relied on creating supply

By 2025, Viet Nam had the highest electric two-wheeler sales penetration among major two-wheeler markets, at 22% (see Figure 2).[2] The country used supportive EV manufacturing policies to attract investment,[3] restricted the production and import of ICE variants to encourage electric two-wheeler production, and supported domestic manufacturers such as VinFast and Pega in developing competitive models.[4] Further tightening of subnational and city-level restrictions on ICE two-wheelers made them more expensive to operate,[5] while electrification requirements for ride-hailing services created additional demand certainty[6]. Together, these policies improved the total cost of ownership for electric two-wheelers and helped drive sales and product innovation. With more than 10 models, VinFast alone sold over 406,000 electric motorcycles in 2025. Viet Nam's electric two-wheeler market now offers models across price and performance segments comparable to those available in India (see Figure 1).

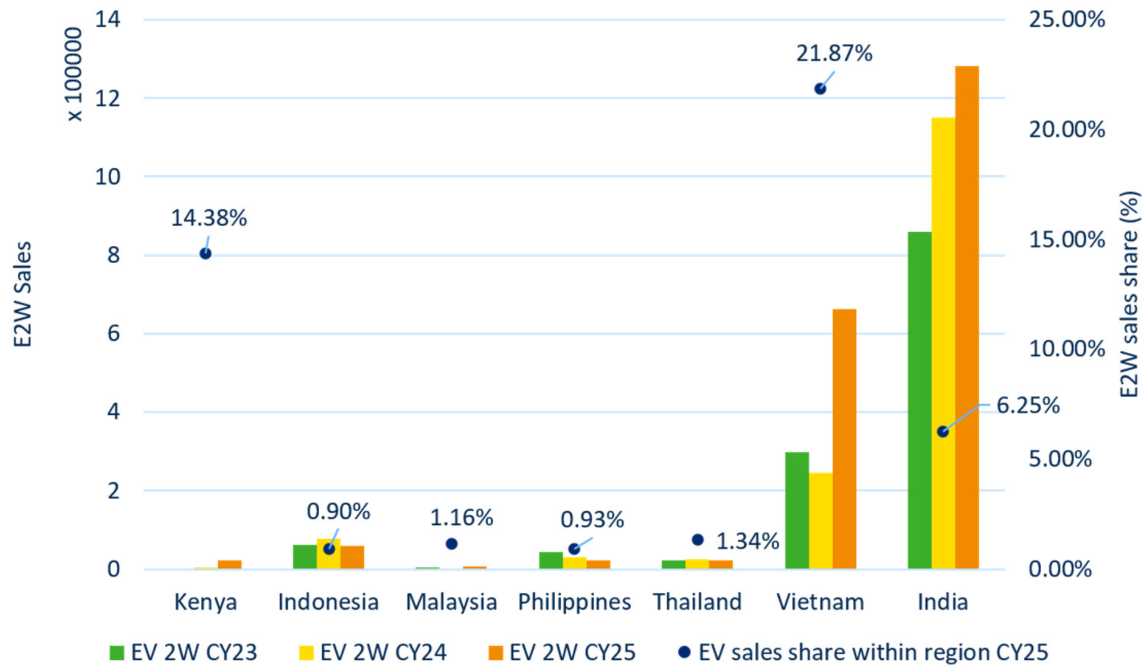

Figure 2. Electric two-wheeler sales penetration in selected markets
Source: Marklines and Vahan Dashboard

Indonesia: from purchase incentives towards product market-fit

Indonesia is the fastest growing two-wheeler market globally and a highly price-sensitive market where two-wheelers are structurally central to the mobility system, representing about 85% of its on-road vehicles.

The initial electric-two-wheeler market was created through purchase incentives introduced in 2023. However, as incentives were withdrawn and policy uncertainty increased in 2025, the market revealed gaps in underlying

[2] Yang Z. (2025) A sneak peek at the 2025 global electric two-wheeler market. The International Council on Clean Transportation. https://theicct.org/sneak-peek-at-the-2025-global-electric-two-wheeler-market-dec25/?utm_source

[3] Approving the action program on green energy transition and reduction of carbon and methane emissions in the transport sector. [statute] (2022) Prime Minister of Socialist Republic of Vietnam. https://datafiles.chinhphu.vn/cpp/files/vbpq/2022/07/876-ttg.signed.pdf

[4] VinFast launches electric motorcycle. (2018) *Vietnam Investment Review* https://web.archive.org/web/20190920203222/https://www.vir.com.vn/vinfast-launches-electric-motorcycle-63542.html; VinFast e-scooter sales surge sixfold, overtaiking Honda in Vietnam. (2026) *Segment Y: Automotive Intelligence.* https://www.segmenty.com/GenerateNewsStaticJsps/VinFast_e-scooter_sales_surge_sixfold__overtaking_Honda_in_Vietnam.html

[5] Adith MS. (2023) Vietnam's EV Landscape & Market: An In-Depth Analysis. Bolt.Earth https://bolt.earth/blog/ev-landscape-in-vietnam

[6] Green SM Bike Service Launches in Hanoi, Starting Operations on August 14, 2023. (2023) *Green SM*. https://www.greensm.com/vn-vi/news/dich-vu-xanh-sm-bike-ra-mat-tai-ha-noi-bat-dau-hoat-dong-tu-ngay-14-8-2023?utm_source

product-market fit. Electric two-wheeler registrations fell 28.6% in 2025, from 77,078 to 55,059 units, indicating that incentives alone had not yet created cost-competitive products to counter the established ICE two-wheelers market.

The slowdown also came at a time when Indonesia remained exposed to international oil price volatility and energy supply risks, making ICE two-wheelers more expensive to operate. This shifted attention among policymakers, manufacturers, and mobility providers from purchase incentives alone toward the need for two-wheeler products that better fit local users and operating conditions.

In response, domestic vehicle manufacturers such as Polytron and Alva introduced alternative ownership models, including battery-rental two-wheeler products, that renewed interest in electric two-wheelers. Indonesia therefore has an opportunity to pivot toward product-led market development, while also leveraging its position as the world's largest nickel supplier and its growing battery ecosystem to develop affordable, locally suited electric two-wheelers.

Table 1. Decadal growth rate of two-wheelers across major global markets

	India	China*	Vietnam	Indonesia
Compound annual growth rate (2016-2025)	2.10%	-3.23%	-1.95%	1.12%
Two-wheeler market share	75%	25%	90%	85%

*https://www.fastener-world.com/data/pdf_download/CFW_65_W_50.pdf

Sources: Indonesia (BPS Indonesia, 2026), India (Ministry of Road Transport and Highways, 2026), Viet Nam (Marklines, 2026), China (IEA)

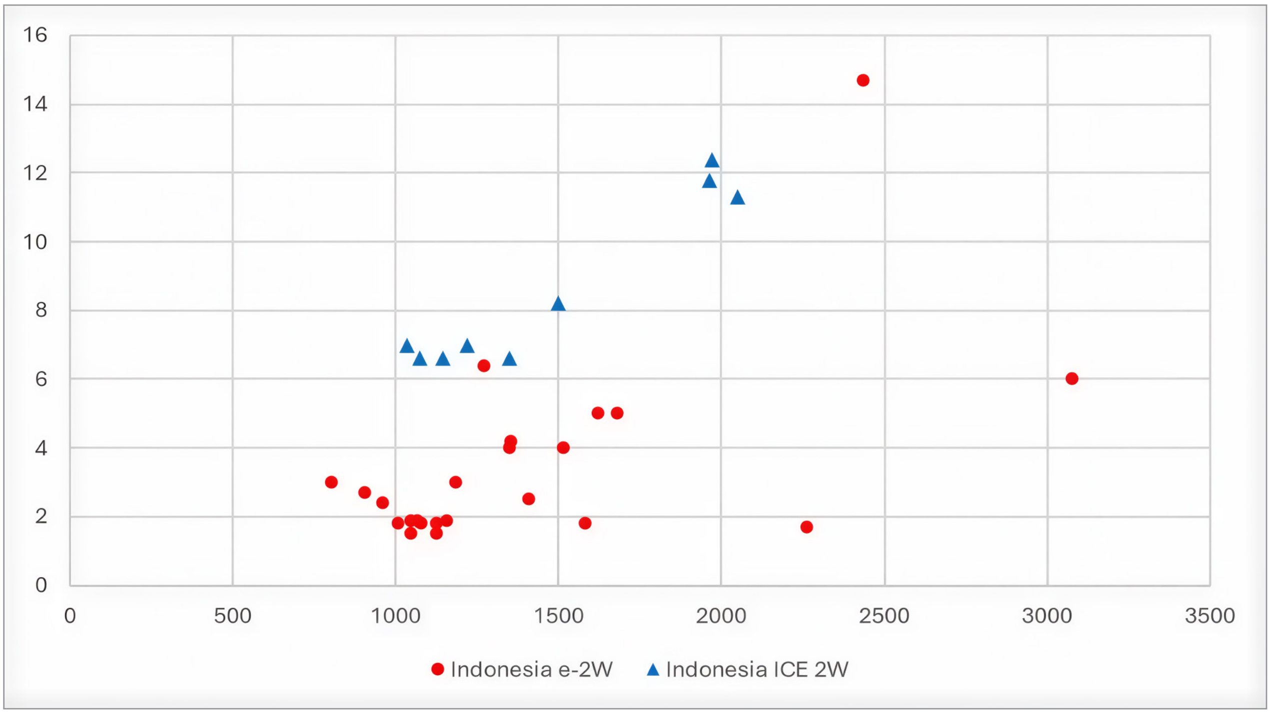

Figure 3. Indonesia's product-market fit in 2025-26

Innovative financing drove early electric two-wheeler sales in African nations

Two-wheeler taxis are a source of livelihood in many African countries. Boda-bodas, the motorcycle taxis widely used in Kenya and other East African countries, are cheaper than cabs and can navigate narrow roads and traffic. But the removal of fuel subsidies in 2022 significantly increased operating costs for petrol two-wheelers. According to the BBC, one boda-boda driver in Kenya spent around USD 6 per day on gasoline, against daily earnings of approximately USD 10-15; after switching to an electric two-wheeler, his daily energy costs fell to about USD 1.42[7]. Lease-to-own and pay-as-you-go models, combined with battery swapping, further improved affordability and eased daily cash flow. These cost savings helped support the success of Uber's Electric Boda, with the World Economic Forum reporting a 30-35% reduction in operating costs for participating drivers[8]. Roam and Ecobodaa have reported similar savings, contributing to a reported 40% increase in Kenya's electric two-wheeler sales in 2024[9].

Similarly, Ampersand's pay-as-you-drive model and battery-swapping network for e-motorcycles reduced operating costs by about 45%, supporting higher electric two-wheeler sales in Rwanda. Rwanda also stopped registering new petrol-powered motorcycle taxis in Kigali, contributing to year-on-year growth in electric two-wheeler sales[10].

Latin America: Income-generating use cases are driving two-wheeler sales and creating an opportunity for electrification

Latin America is at an earlier stage of electric two-wheeler adoption, but its underlying motorcycle market is large and expanding. Mexico sold around 2 million motorcycles in 2025, growing at a 3% compound annual growth rate (CAGR), and its motorcycle market is already about one-fifth the size of its car market[11]. Import statistics reported by Banxico suggest that electric motorcycle imports may have reached approximately 580,661 units in 2024, up 141% year on year, highlighting the scale of emerging demand[12].

The product-market fit of two-wheelers for income-generating activities, such as gig-economy delivery and commercial ride-hailing, is also helping drive uptake in Mexico and Colombia. The opportunity lies in developing electric two-wheelers that meet the needs of high-utilization users: low operating costs, adequate range, reliability, financing, and accessible charging or battery-swapping solutions. Mexico's electric two-wheeler market was already estimated at USD 689 million in 2025.

[7] Kwesi Asara P. (2024) Kenya's push to make 'boda-boda' motorbike taxis go electric. *BBC* https://www.bbc.com/news/world-africa-67781109

[8] Miriri D. (2023) Uber's electric bikes to hit Kenyan roads, cutting emissions and costs. *World Economic Forum*. https://www.weforum.org/stories/emerging-technologies/uber-electric-bike-kenya-africa/

[9] Africa's e-mobility boom is happening on two wheels. (2026) *Techcabal Insights.* https://insights.techcabal.com/africas-e-mobility-boom-2-wheelers/

[10] Same as 9 above.

[11] Mexico motorcycle market 2026: Grwoth slows after six years of exceptional expansion. (2026) *MCD: MotorCycles Data*. https://www.motorcyclesdata.com/2026/06/23/mexico-motorcycles/

[12] Sucedo J. (2025) Acelera la venta de motocicletas electricas por mercado gris. [Electric motorcycle sales accelerate through the grey market. *Milenio*. https://www.milenio.com/negocios/venta-motocicletas-electricas-acelera-mercado-gris-mexico

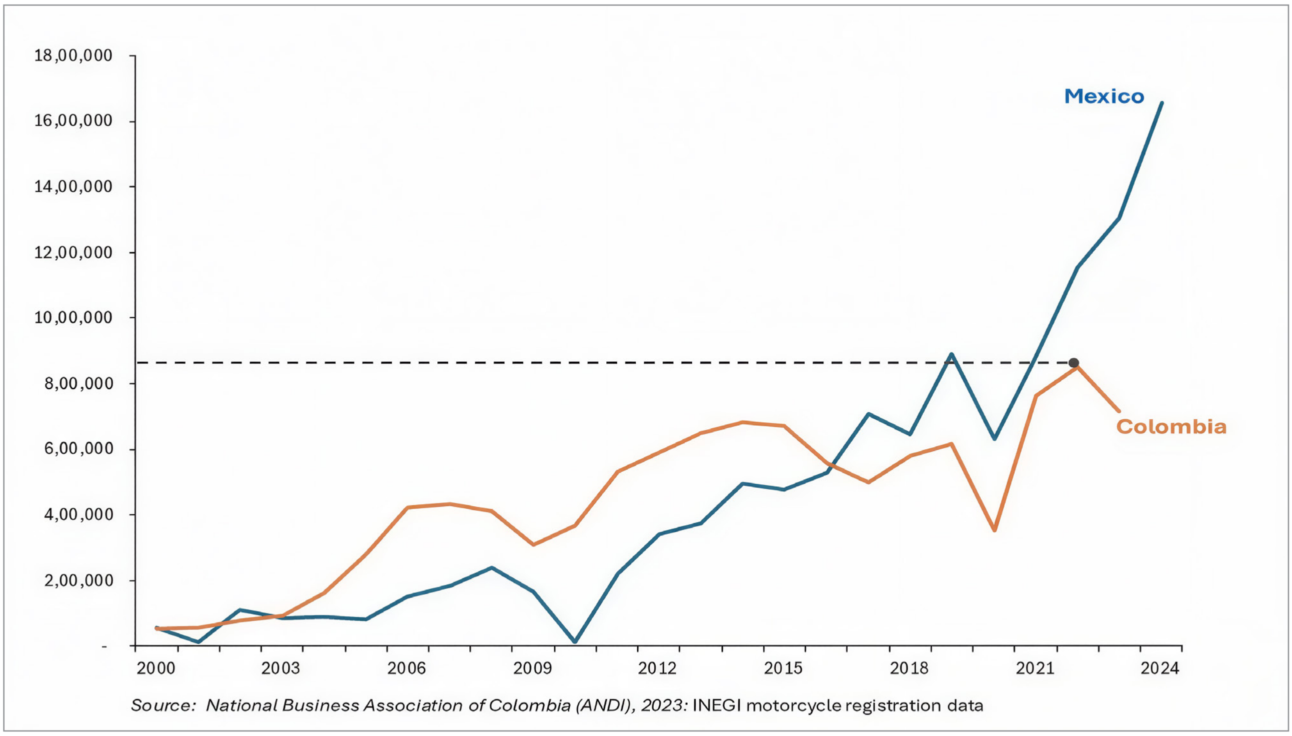

Figure 4. Two-wheeler growth in selected Latin American countries

The next billion electric trips: An agenda for COP31

Across these markets, electrification is being shaped by the vehicle's role rather than the vehicle itself. A commuter scooter in Viet Nam, a delivery motorcycle in India, a boda-boda in Nairobi, and a taxi motorcycle in Kigali have different utilization patterns, financing needs, and infrastructure requirements.

For the broader COP31 decarbonization agenda, this means shifting the question from how quickly countries can electrify a single vehicle category to how they can build electrification pathways that reflect the flexibility and diversity of real mobility systems. Some vehicles will charge at home; others will swap batteries in minutes. Some users will buy vehicles outright; others will lease them or pay per kilometer. Some markets will need purchase incentives; others may respond more strongly to financing mechanisms or battery-service models.

The transition will not look the same everywhere, and the global electric two-wheeler market already reflects this diversity. Nearly 10 million electric two-wheelers were sold in 2025 in different markets and for different reasons. Growing markets in Africa and Latin America present additional opportunities.

For policymakers, manufacturers, financiers, and city governments, supporting the next billion electric trips will require recognizing these differences, understanding the use cases and economics that work, and developing the products, policies, and business models that can make electric two-wheelers competitive.

Different users, different economics. Different transition pathways, but one goal: decarbonized trips. This may be the Global South's greatest opportunity to build a transport transition that is cleaner, affordable, inclusive, and resilient.

Turning Climate and Industrial Ambitions into Action: Designing Vehicle CO_2 Standards for Mexico

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Mexico's transportation sector accounts for 23% of the country's greenhouse gas (GHG) emissions, with light-duty vehicles (LDVs) responsible for roughly 65% of transportation emissions.[1] Mexico has committed to reducing economy-wide emissions by 35% by 2030 and proposed targets zero-emission vehicles (ZEVs)—including battery electric and plug-in hybrid vehicles—to reach 30% of new vehicle sales by 2030 and 65% by 2035.[2] At the same time, Plan México, an economy-wide industrial and infrastructure strategy for 2030, aims to increase vehicle production for domestic consumption by 10%, increase domestic vehicle content by 15%, and design and assemble 100% of all-electric Olinia vehicles in Mexico.[3] Translating these national targets into sector-level regulations and standards is an important step toward achieving them.

Phase 3 of Mexico's Norma Oficial Mexicana 163 (NOM-163), the country's standard for vehicle CO_2 emissions for model year (MY) 2028 and beyond, is currently being drafted. It represents an opportunity not only to reduce vehicle emissions but also to build the innovation needed for Mexico's automotive industry to remain competitive as global vehicle sales shift toward electrification. While vehicle emissions standards are traditionally viewed as climate policy, they can also serve as industrial policy by shaping manufacturers' investment decisions and creating incentives for early investment in electrification. Framing these standards this way may also make more ambitious regulation politically feasible by highlighting the economic and industrial benefits, alongside the climate benefits, of electrification.

1 SEMARNAT. (2025) "Actualización de la Contribución Determinada anNivel Nacional 3.0 de México." Gobierno de México. https://unfccc.int/sites/default/files/2025-11/NDC%203.0%20Me%CC%81xico_spanish.pdf

2 International Council on Clean Transportation. (2026). "Resultados EV Roadmap y Fase 3 NOM-163" [Presentation].

3 Gobierno de México (2025). Plan México: Estrategia de desarrollo económico equitativo y sustentable para la prosperidad compartida: Primer borrador." https://www.planmexico.gob.mx/assets/pdf/Plan_Mexico_PrimerBorrador.pdf

NOM-163 therefore has the potential to do more than reduce vehicle emissions. This study examines how different CO_2 standard designs could accelerate vehicle electrification and help Mexico achieve its ZEV targets while creating stronger financial incentives for manufacturers to invest in the skills, technologies, and innovation needed to remain competitive in the global transition to electric mobility.

Three Policy Design Features Driving Electrification in NOM-163

Mexico's NOM-163 establishes fleet-average CO_2 emissions standards for new LDVs, measured in grams of CO_2 per kilometer (gCO_2/km). The standard becomes more stringent across model years, reaching an industry-average target of approximately 89 gCO_2/km for passenger cars and 131 gCO_2/km for light trucks by MY 2027.[4] Rather than applying a single target to all vehicles, each automaker's compliance target is determined by its sales fleet. Vehicle attribute curves specify allowable CO_2 emissions based on vehicle footprint, meaning manufacturers selling larger vehicles have higher (less stringent) fleet-average standards.

The attribute curve is one of three compliance flexibilities—or features of the policy that make the standard flexible—that determine its effective stringency. The second feature is multipliers, which allow highly efficient vehicles—including battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), and hybrid electric vehicles (HEVs)—to count as more than one vehicle toward compliance. The third is technology credits—compliance credits for so-called off-cycle emissions-reducing technologies, such as efficient air-conditioning, whose benefits are not fully captured by standard drive-cycle testing. These mechanisms give manufacturers flexibility and affect requirements for a vehicle manufacturer's reductions in fleet-average emissions and increased ZEV sales.

The current Phase 2 NOM-163, covering MY 2025–27, includes the most generous flexibility mechanisms (multipliers and technology credits) of any similar standard globally (Table 1)[5,6] BEVs, PHEVs, and HEVs receive multipliers of 13.5x, 8.3x, and 5x, respectively, applicable to up to 50% of eligible vehicles. Internal combustion engine vehicles (ICEVs) and HEVs can also receive technology credits of up to 25.59 gCO_2/km for passenger cars and 29.96 gCO_2/km for light trucks. While intended to incentivize more efficient technologies, these provisions can reduce effective stringency by allowing manufacturers to comply with fewer actual ZEV sales.

Table 1. Summary of the principal design features driving electrification

Design feature	Description	Phase 2 design
Target (vehicle attribute curve)	Fleet-average emissions "curve" for each manufacturer based on vehicle size and segment	Cars: 89 gCO2/km Light truck: 131 gCO2/km
Multipliers	Weighting where "clean" vehicles can count as more than one unit	BEVs: 13.5x PHEVs: 8.3x HEVs: 5x (applied to 50% of eligible sales)
Technology credits (Off-cycle)	Capture emissions reduction technologies not fully reflected in standard drive-cycle testing	Cars: 25.59 gCO2/km Light trucks: 29.96 gCO2/km

4 International Council on Clean Transportation. (2025) "CO_2 emission standards to achieve Mexico's 2030 electrification target for light-duty vehicles." https://theicct.org/wp-content/uploads/2025/01/ID-228-%E2%80%93-Mexico-CO2_brief_final2.pdf

5 Diario Oficial de la Federación. (2023) https://www.diariooficial.gob.mx/normasOficiales.php?codp=5144&view=si#

6 Robinson A, Tal G. (2026) Designing flexible supply-side regulations for light-duty vehicle decarbonization. Manuscript under review at Energy Policy.
Online supply-side regulation toolkit for policy makers accessible at https://ev.ucdavis.edu/ssr-toolkit/about-the-ssr-toolkit.

Removal of Flexibilities is Required to Achieve 2030 Targets

We modeled alternative Phase 3 designs to assess how changes to headline CO_2 targets and compliance flexibilities would affect the ZEV sales required for compliance. Scenarios varied BEV, PHEV, and HEV multipliers, technology credits, and headline target stringency. The analysis also accounted for projected changes in the Mexican vehicle market, including increasing the market share of Chinese vehicle manufacturers and improvements in ICEV and PHEV efficiency.

The results show that the current Phase 2 design is insufficient to achieve Mexico's targeted level of electrification in 2030 (Figure 1). With existing multipliers and technology credits, manufacturers can meet the standard with few or no ZEV sales. Removing technology credits while retaining multipliers produces little increase in required electrification, demonstrating the particularly strong effect of HEV multipliers. Phasing out flexibility mechanisms substantially increases the ZEV share required for compliance and may be sufficient to achieve the 2030 target market share of 30%. However, maintaining Phase 2 headline targets does not require automakers to achieve the 65% ZEV sales share targeted for 2035.

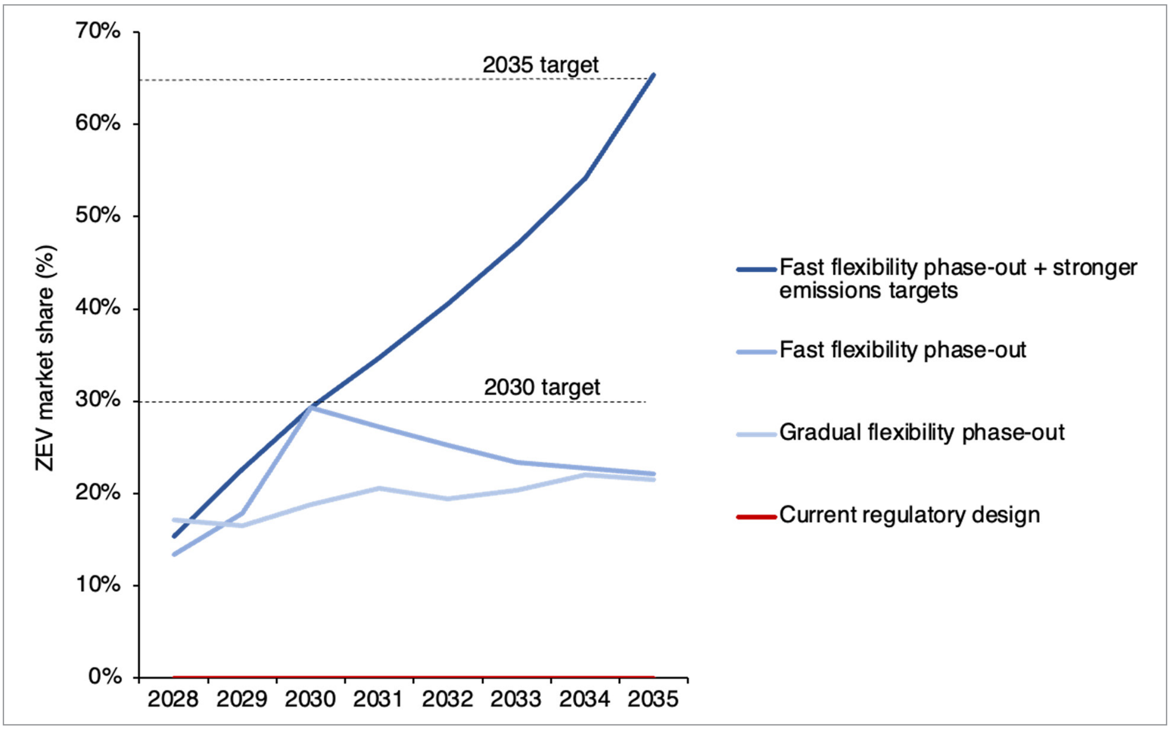

Figure 1. Industry-required ZEV sales share under different Phase 3 NOM-163 design scenarios

Three design changes emerge. First, BEV and PHEV multipliers should be progressively phased out within the first three model years of Phase 3, while HEV multipliers should be eliminated before its commencement. Second, technology credits should be eliminated before Phase 3 or substantially reduced and phased out over the initial model years. Third, stronger headline targets are necessary to drive electrification beyond 30%. To achieve Mexico's 65% ZEV sales target by 2035, our modeling indicates that Phase 2 headline targets would need to decline by approximately 50–57%, reaching average targets of 39 gCO_2/km for passenger cars and 50 gCO_2/km for light trucks by MY 2035. Both stronger targets and flexibility phase-outs are necessary to align the standard with Mexico's electrification goals.

NOM-163 Could Be a Revenue-Generating Tool for Over-Compliant Manufacturers

By including credit trading, an ambitious CO_2 standard allows manufacturers that outperform the standard to sell surplus credits to under-complying automakers. We modeled manufacturer-level compliance for MY 2028–2030 under the most feasible Phase 3 designs that included credit trading. We projected vehicle sales and three electrification scenarios based on publicly announced vehicle manufacturer commitments: high, medium, and low (Table 2). Credit prices were modeled at US$40 per lifetime tonne of CO_2, which is lower than the US$50 penalty for non-compliance.

Table 2. Total industry and government revenue generation (in millions USD) under ZEV commitment scenarios for each regulatory design scenario

	Fast flexibility phase-out		Gradual flexibility phase-out	
ZEV commitment scenario	Industry revenue	Government revenue	Industry revenue	Government revenue
Low (+10 years)	464	1,256	427	1,832
Medium (+5 years)	170	318	123	723
High (+0 years)	149	0	185	0

More stringent standards create greater demand for ZEV credits and therefore greater potential value for manufacturers that over-comply. Under low and medium electrification scenarios, credit demand consistently exceeds supply, creating a "seller's market" in which over-compliant manufacturers could potentially sell credits at or near the penalty price. Under the high electrification scenario, credit supply exceeds demand, suggesting prices would fall as more manufacturers could comply without purchasing credits. This highlights the importance of setting the standard relative to expected market electrification. Government revenue is generated when manufacturers with compliance deficits pay the US$50 penalty per ton of CO_2.

The potential value to ZEV-selling manufacturers is substantial. Under the current Phase 2 headline target, our modeling estimates that a manufacturer could generate approximately US$737–$1,511 in credit revenue per new BEV, depending on vehicle size and credit price. While a more stringent target would reduce credits generated per ZEV, it would also increase overall demand. Properly designed, NOM-163 could turn early investment in ZEV production into a source of revenue while increasing the cost of delayed electrification for manufacturers that trail behind.

Policy Implications

Our analysis has several implications for the design of NOM-163 Phase 3:

- To meet 2030 electrification targets, BEV and PHEV multipliers should be progressively phased out within the first three model years of Phase 3. HEV multipliers should not be included.
- Technology credits should be eliminated before Phase 3 or substantially reduced and phased down across model years.
- Stronger headline targets are essential to achieve electrification above 30%. To meet Mexico's 65% ZEV sales goal by 2035, Phase 2 headline targets need to be reduced by 50–57%.
- More stringent standards increase demand for ZEV credits and can increase their value, although total revenue depends on the balance of credit supply and demand.
- Under the baseline headline target, ZEV credit sellers could earn between $737 and $1,511 per vehicle, depending on vehicle size and credit price.

The Role of Supply-Side Policies in Scaling EV Adoption in Emerging Markets[1]

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Building a Comprehensive E-Mobility Policy Framework

Over the past five years, EV adoption has accelerated in several markets in Asia, Africa, and Latin America.[2] Governments have supported this growth through policies such as incentives, vehicle standards, import rules, charging programs, and industrial-development measures. The right mix varies by country. It depends on the government's capacity to design and enforce policy, the public resources available, the structure of the vehicle market, and national policy objectives, such as energy security, affordable mobility, industrial development, and emissions reduction.

However, translating early adoption into sustained market scale requires moving beyond policies that stimulate consumer demand alone. It requires the development of an enabling market ecosystem that can address affordability and supply constraints while managing the safety, environmental, and system-level risks associated with the transition.

For countries where EV markets are still at an early stage of development, policy frameworks need to take a systems approach from the outset, linking clean and zero-emission vehicle deployment with the wider market, infrastructure, financial, technical, and environmental conditions needed for sustained growth. As shown in Table 1, comprehensive e-mobility frameworks should integrate measures that:

To keep the terminology clear, this article uses electric vehicles (EVs) as the broad term for vehicles powered by electricity, and zero-emission vehicles (ZEVs) when referring to regulatory categories for vehicles with no tailpipe emissions, such as battery-electric and fuel-cell electric vehicles. Internal-combustion engine vehicles (ICEVs) refers to conventional gasoline and diesel vehicles.

1. **Use supply-side policies to increase the availability and model mix of EVs and EV components in the market.** Supply-side policies shape what vehicles and components are produced, imported, and sold. They include supply-side regulations, such as fuel-economy or CO2 standards, ZEV sales requirements, and phase-out targets for internal-combustion engine vehicles (ICEVs); economic instruments that support local assembly and manufacturing; and fiscal or regulatory measures that influence the import of new and used ZEVs and ICEVs.
2. **Apply demand-side policies to make EV adoption more economically attractive for private consumers and fleet operators.** These include fiscal incentives that reduce upfront purchase costs or ownership costs over time, non-fiscal measures that improve the convenience and relative attractiveness of EVs, and fleet-electrification policies such as demand aggregation, fleet targets, and targeted fleet incentives.
3. **Develop charging infrastructure policies that align charging deployment with national EV roadmaps and segment-specific needs.** These policies help determine the type and scale of charging infrastructure

[1] This article is adapted from a forthcoming e-mobility toolkit jointly developed by the UC Davis Institute of Transportation Studies (ITS-Davis) and the World Bank Group.

[2] Ramji A, Palia R (2026). From Adoption to Production: Global South's Expanding EV Footprint. *Majority Mobility* 1(2):21–26. https://escholarship.org/uc/item/2d42b5gs#page=21

required while setting rules and programs for utility and power-sector readiness, tariffs, permitting, investment support, and grid-impact management.

4. **Establish technical standards and programs to support safe, reliable, and interoperable EV adoption.** These include technical standards, legally enforceable regulations, testing and certification systems, and workforce training programs covering EVs, batteries, and charging infrastructure, with attention to safety, consumer protection, and interoperability.
5. **Develop financing programs and mechanisms to address financing barriers for consumer, fleet, and public-transport electrification.** Governments can support financial institutions and investors through public finance, concessional finance, risk-sharing facilities, payment guarantees, market-design, and contracting models such as subvention, bifurcated asset ownership, and gross-cost contracting. These instruments can help reduce upfront cost and bankability barriers while mobilizing private capital in a fiscally sustainable manner.
6. **Develop battery end-of-life policies for recovery, reuse, and recycling.** As EV adoption grows, these policies help manage batteries reaching the end of their first life by establishing systems for collection, safe handling, reuse, repurposing, recycling, and material recovery. They can also link health and environmental safeguards, circular-economy measures, import controls, and trade or regional-cooperation rules where batteries move across borders or domestic recycling capacity remains limited.

Table 1. Six key components of a comprehensive E-mobility policy framework[3]

[1] Supply	[2] Demand	[3] Charging infrastructure
Policies and regulations to: Grow local assembly and manufacturing Regulate imports of new and used vehicles Set fuel-economy or CO2 standards, ZEV sales requirements, and ICEV phase-out targets	**Measures to bridge viability gaps and meet adoption targets:** Subsidies, incentives, tax breaks, and other fiscal measures Non-fiscal measures such as priority parking or access to bus lanes	**Policies and programs for:** Infrastructure requirements and planning by segment Managing grid impacts across power generation, transmission, and distribution Tariffs, approval processes, building codes, public-private partnership (PPP) models, and funding programs
[4] Standards	**[5] Financing**	**[6] Recovery, reuse, & recycling**
Standards and systems for: Vehicle and battery safety Vehicle certification standards and processes Charging and interoperability standards	**Financing mechanisms such as:** Priority-sector lending mandates Risk-sharing facilities with government participation Payment guarantee mechanisms, especially for public transport	**Policies and programs for:** Collection and safe processing Reuse and repurposing Recycling and material recovery Producer responsibility or other financing mechanisms

Supply Side Policies: Creating Market Certainty and Enabling Investment

Within this wider policy package, supply-side policies play an important role in shaping the vehicles, components, and technologies that are actually made available in the market. This is especially relevant in low- and middle-income countries, where vehicle markets are often small, import-dependent, and shaped by the production and investment decisions of global original equipment manufacturers (OEMs) in larger markets. In these contexts, demand-side incentives alone may have limited impact if EV models are unavailable, unaffordable, or lack

[3] Framework developed by the International Finance Corporation (IFC) for the forthcoming e-mobility toolkit jointly developed by ITS-Davis and the World Bank Group.

adequate after-sales support. Supply-side policies address this constraint through a combination of regulatory and economic instruments.

Supply-side regulations—including fuel-economy or CO2 standards, ZEV sales requirements, and ICEV phase-out targets—directly influence the vehicles and technologies that manufacturers and importers bring to market. Well-designed supply-side regulations establish a predictable trajectory for cleaner vehicles and ZEV deployment, backed by monitoring and penalties for non-compliance. This regulatory certainty can encourage suppliers to introduce more EV models and make longer-term investments in production, distribution, after-sales services, and charging infrastructure. As markets expand, greater scale and competition can also contribute to lower costs. However, there is no guarantee of price reductions if the regulation is poorly designed.

Supply-side regulations can be particularly attractive where governments have limited fiscal space. Unlike purchase subsidies and tax incentives, their principal compliance costs fall on manufacturers and importers rather than public budgets. They may also simplify oversight by concentrating obligations among a relatively small number of regulated entities. However, their effectiveness still depends on credible targets, reliable vehicle and sales data, and sufficient institutional capacity to monitor and enforce compliance.

Economic instruments can complement the market direction created by these standards and targets by reducing the cost and risk of investing in EV production and related supply chains. Customs and tax concessions, investment allowances, production-linked subsidies, capital grants, concessional finance, and support for research and technology upgrading can help firms establish new EV production capacity or retool existing ICEV facilities.

When tied to measurable outcomes—such as domestic value addition, production, investment, supplier development, or employment—these instruments can support local assembly, deepen participation in battery and component value chains, and help existing automotive industries remain competitive as global markets shift from ICEVs to EVs.

The appropriate policy mix depends on the structure of the domestic vehicle market. In countries with limited domestic production, import-duty and tax measures can improve the commercial viability and affordability of bringing EVs to market.

In countries where an automotive industry already exists or is emerging, time-bound import concessions can be linked to future investment, local production, or value-addition commitments by global OEMs. When designed to work together, supply-side regulations and economic instruments can align EV market growth with industrial development—regulations create a predictable market trajectory, while targeted economic support enables firms to invest in the production capacity, technologies, and supply chains needed to meet growing demand.

Tailoring the Supply-Side Policy Mix to National Context

The appropriate combination of supply-side policies depends on national circumstances, particularly a country's income classification and the structure of its automotive market. Income level shapes fiscal space, institutional capacity, and the sophistication of regulatory systems, while market structure determines whether the immediate priority is expanding EV supply through imports, supporting early assembly, or transitioning an established manufacturing base. These conditions influence the feasibility of performance-based standards, ZEV sales requirements, ICEV phase-out measures, and economic instruments supporting imports or domestic production. A clear overarching legal and institutional framework is also necessary to coordinate these measures.

Table 2 provides a framework for matching policy priorities with six broad market types. These types provide indicative policy pathways that countries can adapt to their specific market conditions, institutional capabilities, and strategic objectives.

Table 2. Market types and supply-side policy priorities for EV market development

Market Type[4]	Main Supply-Side Policy Priority	Main Supply-Side Policy Priority	Fiscal and Governance Considerations
Emerging - import	Ensure early EV availability and supplier market entry.	Import-duty relief, indirect-tax concessions on imported completely built-up (CBU) EVs, and performance-based standards where institutional capacity allows.	Use simple, low-cost instruments with clear compliance obligations.
Emerging - import, early assembly	Support early market EV access while building a pathway toward local assembly and value addition.	Time-bound import concessions, completely knocked down/semi-knocked down (CKD/SKD) facilitation, assembly-linked tax incentives, and performance-based standards or combination standards where institutional capacity allows.	Small market size and early-stage industry structure increase the risk that incentives become open-ended unless they are time-bound and linked to clear assembly milestones. Coordination between trade, finance, and industry ministries is essential.
Advanced - import-dependent	Increase imports of clean and zero-emission vehicles.	Technology-based standards or performance-based standards, depending on administrative capacity.	Robust institutional capacity is needed to administer segment-specific supply-side regulations, verify compliance, and enforce clean vehicle import requirements.
Emerging - manufacturing, domestic	Build domestic value addition and supplier ecosystems.	Tax incentives, capital grants, concessional finance, R&D support, local assembly support, and performance-based standards.	More fiscal space and stronger inter-ministerial coordination are needed to manage conditional support effectively and avoid windfall gains.
Emerging - manufacturing, export-oriented	Deepen industrial competitiveness and regional and global market integration.	Export-linked incentives, relocalization credits, supplier upgrading support, and performance-based standards or combination standards.	Larger market reach, stronger industrial coordination, and trade facilitation are critical. Export conditionality and regional trade agreements shape instrument design.
Advanced - manufacturing	Support full value-chain upgrading and accelerate regulatory transition.	Combination standards, technology-based standards, and performance-based standards.	Strong fiscal space and robust enforcement capacity support the most ambitious and comprehensive policy packages.

Several factors should guide policy selection within each type:

- **Fiscal capacity** determines whether governments can sustainably fund grants, concessional finance, production subsidies, or tax and duty concessions.
- **Governance capacity** shapes which instruments governments can credibly administer, monitor, and enforce. In countries where capacity is limited, simpler measures focused on a small number of manufacturers or importers may be more practical.
- **Market structure**—including market size, import dependence, assembly capacity, and manufacturing orientation—determines whether import-side or industrial-development instruments should be prioritized.
- **EV ambition**: Beyond these structural and institutional factors, the level of political priority a government places on accelerating its EV transition, relative to other economic and policy objectives, shapes how assertively it pursues supply-side policies.

The contrasting experiences of Chile and India illustrate how national contexts, particularly differences in automotive market structure, translate into distinct supply-side policy choices (Box 1).

[4] "Emerging" refers to low- and middle-income countries; "Advanced," to high-income countries; "Import," to both used and new imports.

Box 1. Country case studies: Chile and India

Chile's predominantly import-dependent vehicle market made a performance-based vehicle-efficiency standard targeting importers and brand representatives a practical policy choice. The policy's technology-neutral design allows suppliers to comply through more efficient ICEVs as well as increased EV sales, providing a gradual transition pathway where EV affordability and infrastructure remain constraints.

Chile's Energy Efficiency Law, adopted in 2021 and implemented for light-duty vehicles in 2024, has delivered encouraging early results. By 2025, 88% of importers had improved their fleet fuel economy, while the average efficiency of newly approved vehicles increased by 7.3%, compared with an average annual improvement of 2.5% during the preceding decade. Between 2023 and 2025, the market share of battery electric vehicles rose from 0.59% to 2.22%, available battery electric vehicle models tripled, and average plug-in vehicle prices, including plug-in hybrids, fell by 17%. The standard also contributed to avoiding approximately 8,000 tonnes of CO2 and saving nearly 2.5 million litres of fuel.[5]

India, by contrast, is a large emerging economy with an established domestic automotive industry. Its supply-side strategy combines fuel-efficiency standards with incentives for domestic manufacturing. Passenger-vehicle fleet-average targets tightened from approximately 130 gCO2/km under the Corporate Average Fuel Economy (CAFE) I standard to 113 gCO2/km under CAFE II, creating pressure for manufacturers to improve vehicle efficiency and introduce cleaner technologies.

India complements these standards with production-linked incentives for advanced vehicles, components, and battery cells. The USD 3.1 billion PLI-Auto scheme links support to investment, sales, and a minimum 50% domestic value-addition requirement, ensuring that incentives promote localization rather than final assembly alone. By late 2025, the scheme had mobilized approximately USD 4.3 billion in investment, generated nearly 49,000 jobs, and supported more than 1.36 million EVs, primarily electric two-wheelers. Further upstream, the USD 2.2 billion PLI-ACC scheme aims to establish 50 GWh of domestic battery-cell manufacturing capacity, of which 40 GWh has been awarded. Together, these measures demonstrate how a manufacturing economy can use regulatory standards to shape the market while building domestic capabilities across the EV value chain.

Countries should view the types in Table 2 as a guide for adapting and strengthening their policy and regulatory frameworks. As markets grow and institutional capacity strengthens, governments could expand their policy ambition, deploying more sophisticated regulatory standards and, where viable opportunities for domestic production exist, complement them with targeted manufacturing incentives. Strengthening institutional capacity does not necessarily lead to domestic industry development, as the two can evolve independently depending on a country's underlying market structure and industrial base.

[5] Centro de Movilidad Sostenible (2025). Monitoring Report on the Energy Efficiency Law: Energy Efficiency for Light-Duty Vehicles in Chile—Results from 2024 to June 2025. https://cmsostenible.org/wp-content/uploads/2026/04/Monitoring-Report-of-the-Energy-Efficiency-Law.pdf

MARKET WATCH

The Global South (excluding China) Doubled Its Contribution to Global Passenger EV Sales, from 4% to 8%

Global passenger electric vehicle (EV) sales reached 5.51 million units in Q2 2026 (April–June 2026), accounting for 26% of total passenger light-duty passenger vehicle sales.[1] This represents a 6% year-on-year (YoY) increase in passenger EV sales compared with Q2 2025, when EVs accounted for 25% of total light-duty passenger vehicle sales.

China continued to be the largest contributor to global passenger EV sales, accounting for 50% of global EV sales in Q2 2026. Within China, EVs accounted for 60% of passenger LDV sales in Q2 2026, recovering from 43% in Q1 2026 and surpassing the 56% EV sales share recorded in 2025. The EU and the US followed China, accounting for 18% and 5% of global passenger EV sales, respectively.

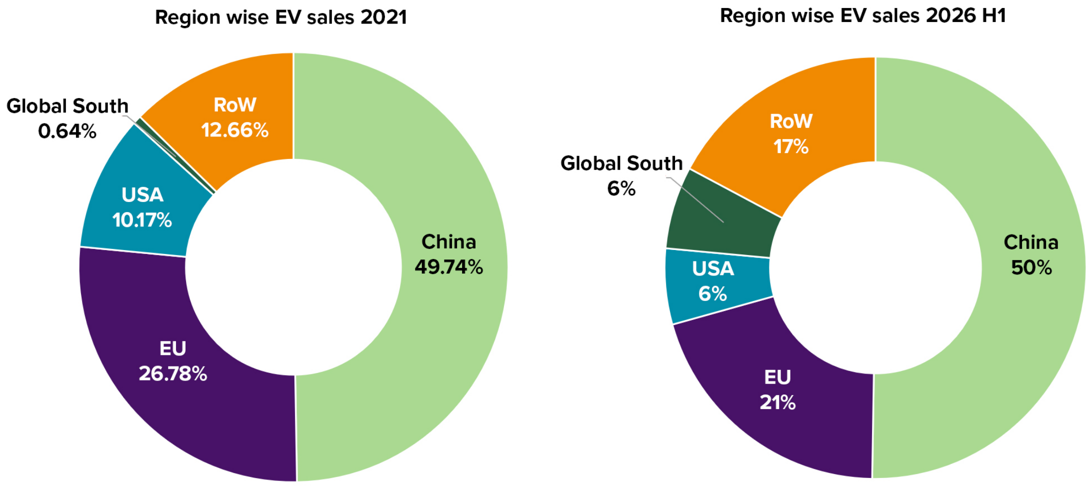

Figure 1: Regional EV sales in 2021 and 2026 H1 (RoW, rest of the world)

Meanwhile, Global South countries excluding China doubled their contribution to global passenger EV sales, reaching 8% in Q2 2026 compared with 4% in Q2 2025. This growth highlights the increasing role of emerging markets in the global passenger EV transition.

[1] Passenger vehicles include all light-duty vehicles used for personal mobility and EVs refer to Battery Electric and Plug-in Hybrid electric cars.

Global South countries (excl. China) contributed 8% of global passenger EV sales in Q2:2026

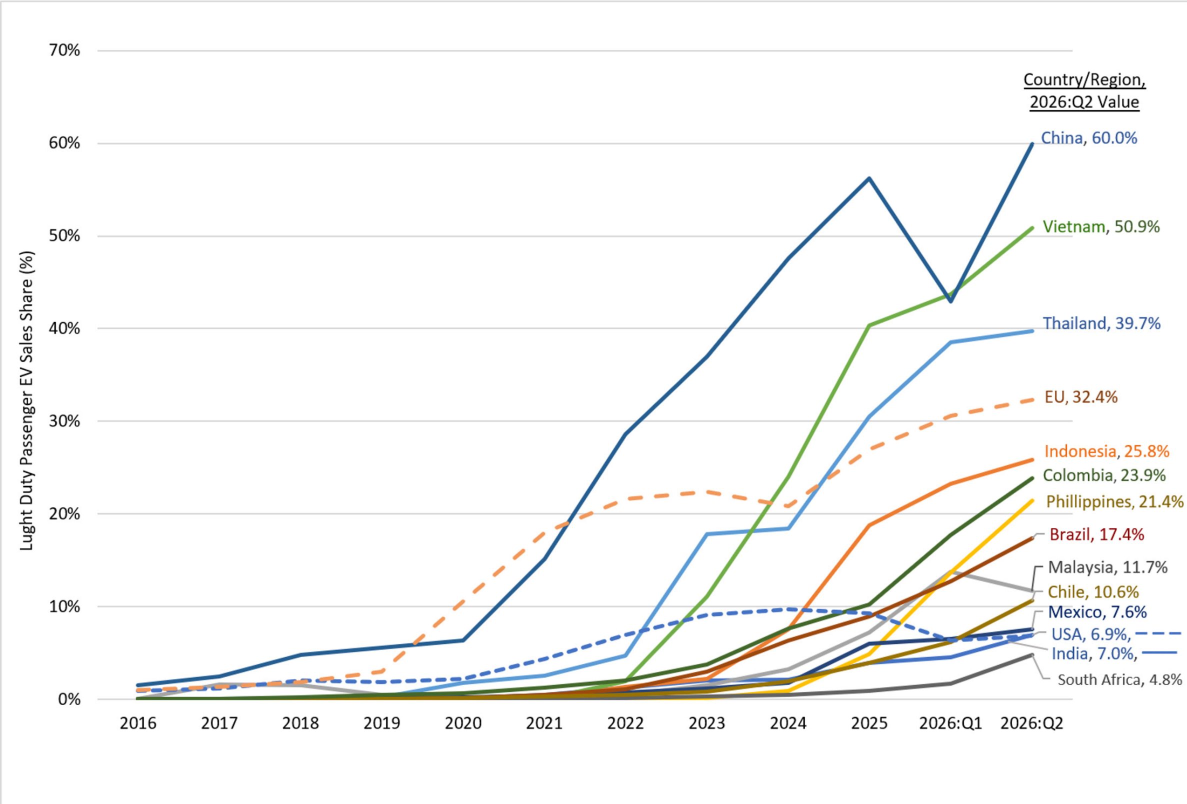

Figure 2: Light-duty passenger EV sales share in key markets, 2016 – Q2 2026 (Note: The x-axis scale changes at the far right: the spatial interval for a year up to 2025 is the same size as the interval between 2025 and 2026 Q1 and between 2026 Q1 and Q2.)

Light-duty passenger EV sales across 11 Global South countries excluding China continued to gain momentum, with these markets collectively recording over 443,687 EV sales in Q2 2026—an almost two-fold increase (99% YoY) compared with Q2 2025.[2] Together, these 11 countries and China accounted for 58% of global passenger EV sales during the quarter.

India and five key ASEAN markets: Indonesia, Malaysia, the Philippines, Thailand, and Vietnam together recorded 280,906 light-duty passenger EV sales in Q2 2026, representing an 84% increase compared with Q2 2025. In absolute terms, India led the group with 84,692 sales, followed by Vietnam (60,663), Thailand (54,025), Indonesia (40,362), Malaysia (22,123), and the Philippines (19,041).

In terms of EV sales share, Vietnam led the region with 51% of passenger vehicle sales being electric, followed by Thailand at 40%, Indonesia at 26%, the Philippines at 21%, and Malaysia at 12%. These figures indicate that several Asian markets are reaching EV sales shares increasingly close to the EU's 32%, despite being at different stages of vehicle market development. India, despite recording the highest EV sales volume among these markets at 84,692 units, had an EV sales share of just 7%, making it a laggard in terms of market development despite its much larger overall passenger vehicle market and strong technological capabilities.

The technology mix also varies considerably across these markets. India and Vietnam recorded 100% battery electric vehicle (BEV) sales among EVs, while Thailand's light-duty passenger EV sales comprised 89% BEVs and 11% plug-in hybrid electric vehicles (PHEVs). The Philippines showed a more balanced

[2] Global south countries assessed in the article are India, China, Indonesia, Thailand, Vietnam, Malayasia, Philippines, Mexico,Brazil, Colombia, Chile, and South Africa.

mix, with 53% BEVs and 47% PHEVs, while Malaysia recorded 84% BEVs and 16% PHEVs. This variation highlights the different technology pathways emerging across Southeast Asia and India.

Latin America: The combined light-duty passenger EV sales across Colombia, Mexico, Chile, and Brazil reached 157,485 units in Q2 2026, representing a 114% increase compared with Q2 2025. Brazil remained the largest passenger vehicle market in the region and led in EV sales, recording 106,706 units, followed by Mexico with 28,171, Colombia with 16,697, and Chile with 5,911.

In terms of EV sales share, Colombia led the region at 24%, followed by Brazil at 17%, Chile at 11%, and Mexico at 8%. While EV penetration varies considerably across these markets, the relatively high sales shares in Colombia and Brazil have been driven by affordably priced Chinese EV imports that have seen increasing consumer acceptance, as in other emerging markets globally.

The region's EV transition also shows distinct technology pathways across markets. In Chile, BEVs and PHEVs accounted for 53% and 47% of EV sales, respectively, indicating a nearly balanced transition between the two technologies. Brazil showed a similar pattern, with 56% of EV sales coming from BEVs and 44% from PHEVs. Mexico, in contrast, had a greater reliance on PHEVs, which accounted for 58% of EV sales, compared with 42% for BEVs. Colombia stood out with a strong preference for fully electric vehicles, with BEVs accounting for 89% of EV sales and PHEVs just 11%.

Africa: South Africa remains a nascent but rapidly growing light-duty passenger EV market. Light-duty passenger EV sales reached approximately 5,300 units in Q2 2026, up sharply from 839 units in Q2 2025. Despite the relatively small market size, this represents more than a six-fold increase in sales year-on-year. The market also remains strongly oriented toward PHEVs, accounting for 64% of light-duty passenger EV sales, compared with 36% for BEVs. This technology mix highlights the early stage of electrification in South Africa, with PHEVs continuing to play a significant role alongside fully electric vehicles.

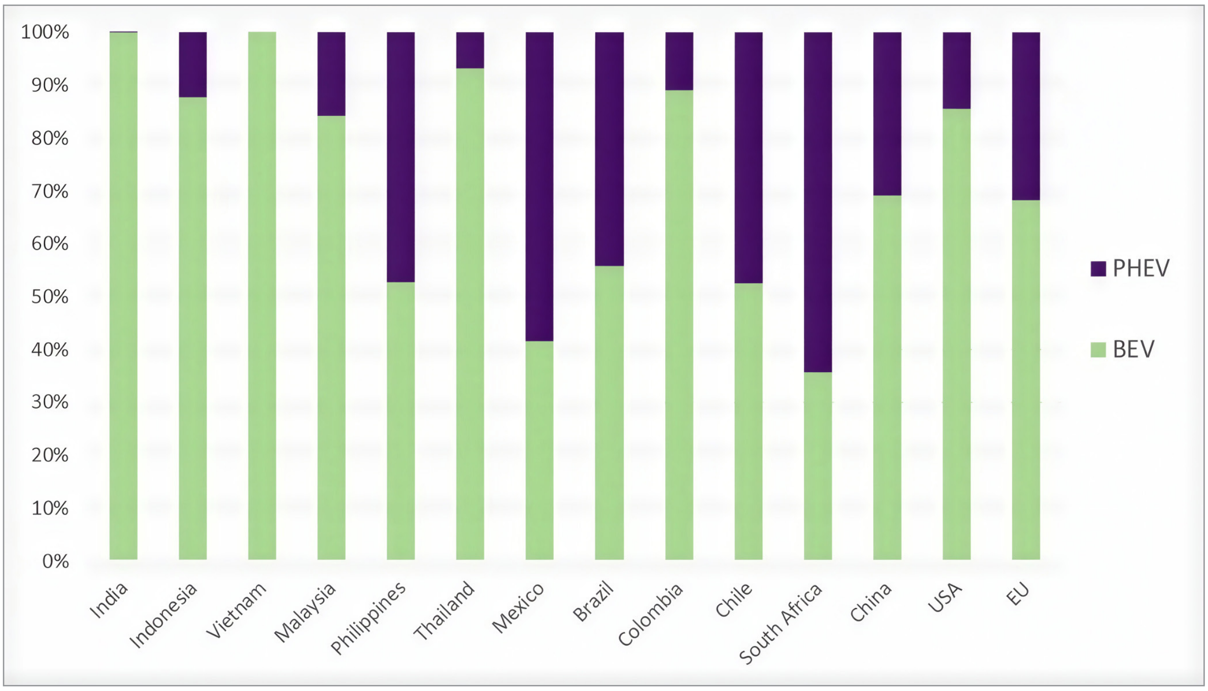

Figure 3: BEV vs. PHEV shares in key markets, Q2 2026

Global South Data Tracker

Table 1: Total Light-duty Passenger Sales (‘000 units)

Region	Country	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026:Q1	2026:Q2
Asia	India	2967	3229	3395	2962	2417	3082	3792	4101	4275	4314	1273	1210
ASEAN	Indonesia	857	830	859	769	378	644	764	762	651	589	149	156
ASEAN	Thailand	378	446	504	582	381	357	444	500	420	455	159	136
ASEAN	Vietnam	160	147	186	230	307	300	377	287	287	435	119	119
ASEAN	Malaysia	512	512	530	547	474	452	637	714	727	748	169	189
ASEAN	Philippines	285	362	284	289	169	199	254	323	352	359	85	89
LATAM	Mexico	1604	1530	1186	1315	949	1015	1086	1361	1496	1511	382	373
LATAM	Brazil	1688	1856	2102	2262	1616	1558	1577	1721	1948	1997	472	614
LATAM	Chile	229	269	314	279	187	296	295	210	209	213	53	56
LATAM	Colombia	216	204	225	230	163	204	212	147	167	209	59	70
Africa	South Africa	361	368	364	354	246	304	363	348	351	422	115	109
Asia	China	23050	23969	23111	21166	20071	21323	20701	21887	23567	23441	4203	4601
North America	USA	17559	17241	17335	17049	14541	15032	13878	15644	15995	16261	3694	4239
Europe	EU	11937	12574	12772	13014	9931	9691	9246	10525	10611	10803	2818	3068

Table 2: Light-duty Passenger EV Share of New Sales (%)

Region	Country	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026:Q1	2026:Q2
Asia	India	0.0%	0.01%	0.04%	0.03%	0.2%	0.5%	1.3%	2.0%	2.1%	3.9%	4.5%	7.0%
ASEAN	Indonesia	0.0%	0.01%	0%	0.02%	0.0%	0.1%	1.4%	2.2%	7.6%	18.8%	23.3%	25.8%
ASEAN	Thailand	0.02%	0.05%	0.18%	0.23%	1.8%	2.5%	4.7%	17.8%	18.4%	30.5%	38.5%	39.7%
ASEAN	Vietnam	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	11.1%	24.0%	40.4%	43.7%	50.9%
ASEAN	Malaysia	0.02%	1.61%	1.54%	0.46%	0.1%	0.3%	0.5%	1.6%	3.2%	7.2%	13.8%	11.7%
ASEAN	Philippines	0.0%	0.0%	0.0%	0.12%	0.2%	0.1%	0.1%	0.1%	0.9%	4.9%	13.7%	21.4%
LATAM	Mexico	0.01%	0.03%	0.04%	0.10%	0.3%	0.4%	0.7%	1.2%	1.8%	6.0%	6.5%	7.6%
LATAM	Brazil	0.0%	0.0%	0.01%	0.06%	0.2%	0.5%	1.1%	3.0%	6.4%	9.0%	12.7%	17.4%
LATAM	Chile	0.0%	0.02%	0.03%	0.08%	0.1%	0.3%	0.5%	0.9%	1.9%	4.0%	6.2%	10.6%
LATAM	Colombia	0.02%	0.07%	0.25%	0.53%	0.7%	1.2%	2.1%	3.8%	7.6%	10.2%	17.8%	23.9%
Africa	South Africa	0.04%	0.05%	0.03%	0.09%	0.1%	0.1%	0.2%	0.3%	0.5%	0.9%	1.7%	4.8%
Asia	China	1.5%	2.51%	4.77%	5.58%	6.3%	15.2%	28.6%	36.9%	47.6%	56.2%	43.0%	60.0%
North America	USA	0.9%	1.16%	2.07%	1.85%	2.3%	4.4%	7.0%	9.1%	9.7%	9.3%	6.4%	6.9%
Europe	EU	1.0%	1.33%	1.89%	2.98%	10.6%	18.0%	21.7%	22.4%	20.9%	27.0%	30.6%	32.4%

Table 3: Light-duty Passenger BEV Share of Total EV Sales (%)

Region	Country	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026:Q1	2026:Q2
Asia	India	0.0%	92.6%	100.0%	99.1%	98.9%	99.7%	100.0%	99.7%	99.9%	99.9%	100.0%	100.0%
ASEAN	Indonesia	0.0%	37.2%	87.5%	62.2%	84.1%	95.9%	99.3%	99.1%	99.7%	95.2%	95.4%	87.8%
ASEAN	Thailand	60.2%	37.8%	23.3%	68.7%	25.0%	21.6%	47.7%	86.6%	88.5%	87.0%	93.3%	88.9%
ASEAN	Vietnam	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	99.7%	99.8%	99.9%	100.0%	100.0%	100.0%
ASEAN	Malaysia	100.0%	1.7%	0.8%	1.7%	13.0%	23.0%	42.8%	83.3%	94.3%	89.8%	89.8%	84.2%
ASEAN	Philippines	0.0%	0.0%	0.0%	99.2%	97.8%	75.0%	83.1%	83.3%	68.8%	46.0%	49.9%	52.7%
LATAM	Mexico	76.0%	67.5%	49.2%	66.5%	75.1%	73.9%	89.2%	87.2%	73.1%	41.7%	41.4%	41.6%
LATAM	Brazil	55.6%	100.0%	22.0%	5.8%	27.8%	27.9%	43.0%	36.2%	49.3%	44.4%	51.3%	55.7%
LATAM	Chile	0.0%	75.0%	53.5%	63.6%	62.8%	59.8%	70.5%	72.9%	75.3%	61.7%	51.3%	52.5%
LATAM	Colombia	52.8%	62.2%	44.4%	62.6%	58.8%	33.4%	44.0%	64.2%	83.2%	87.4%	86.0%	89.1%
Africa	South Africa	62.9%	72.6%	66.7%	51.7%	37.7%	74.7%	75.7%	75.1%	66.6%	27.1%	31.3%	35.7%
Asia	China	75.5%	80.9%	75.1%	79.8%	81.2%	80.8%	74.5%	66.8%	56.6%	61.5%	64.9%	69.2%
North America	USA	53.6%	53.4%	65.9%	74.1%	78.1%	73.1%	80.5%	79.9%	79.6%	78.2%	83.7%	85.5%
Europe	EU	47.7%	51.1%	56.6%	64.0%	51.3%	50.3%	56.0%	65.5%	65.6%	64.8%	67.8%	68.3%

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If you or your organization would like to contribute to a future edition of Majority Mobility, we welcome submissions and perspectives from across regions. Please reach out to us by email to continue the conversation: gscenter@ucdavis.edu

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