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The Global EV Shift

The Role of China and Industrial Policy in Emerging Economies

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Ilaria Mazzocco

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A Report of the CSIS Trustee Chair in Chinese Business and Economics

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INTERNATIONAL STUDIES

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Executive Summary

As Chinese manufacturers are reshaping the global auto industry and catalyzing the transition to electric vehicles (EVs), some emerging markets are actively seeking to shape their own destiny in this rapidly changing—and crucial—industry. This report draws from a comparative analysis of strategies for EV adoption and industrial development in emerging markets to offer lessons for policymakers. It explores how and why China is catalyzing the transition in many markets, providing analysis from the perspective of countries in Asia, Latin America, and Africa. It also offers several insights into what factors governments should consider when seeking to balance economic development, climate, and geopolitical goals—most notably in terms of reliance on China—in the EV industry.

EVs are proving to be very popular in some emerging markets, surprising many industry experts. Passenger vehicle sales in these markets are relatively small, but in aggregate, emerging markets are expected to be a source of growth for the industry in the future. The expansion in the supply of passenger EVs and increased competition between producers, largely as a result of the rapid internationalization of Chinese manufacturers, has been the leading driver of growth in sales in several markets. Several governments are also seeking to promote EVs for economic reasons: EV adoption can help reduce oil imports and stabilize foreign currency reserves, or bolster emerging domestic industries such as charging infrastructure and digital platform providers.

Emerging and developing markets are often overlooked in discussions concerning technological diffusion and industrial strategies, but they offer powerful lessons on how industrial policy can either work or fail, the role of Chinese investment, and important implications for the future of the

automotive sector. The case studies covered in this report—which focus especially on developments in Costa Rica, Brazil, Indonesia, India, Mexico, and South Africa—offer insights for policymakers as they grapple with industrial transformation, technological transition in the mobility sector, creating new opportunities for their countries, and their relationship with China.

Governments have two basic pathways available for increasing the domestic supply of affordable EVs: trade policy to facilitate imports and industrial policy aimed at increasing domestic production. The former leverages growing international production capacity, especially from China, while the latter focuses on developing domestic value chains. Although not mutually exclusive, there are trade-offs between the two approaches. Trade provides a faster pathway to electrification but can also lead to the potential displacement of existing and emerging domestic industries, while industrial policy is a slower, potentially more costly and difficult pathway that could, however, if successful, have a higher political payoff.

As a result, emerging market governments concerned about domestic producers will need to be careful to balance protectionism, which can provide breathing space for manufacturers, and competition, which is necessary to foster innovation and create a market. Indeed, trade defense policies generally appear to work best as a tool of industrial policy when there are mechanisms that hold companies to some standard and put competitive pressure on them, such as sunset provisions and review processes embedded in the tariff policy. Some countries—including Indonesia, Thailand, and Brazil—have been experimenting with the use of tariffs to attract investment from abroad as well, with some success. But given how recently most of these policies have been implemented, many questions remain regarding long-term trajectories.

The sheer size of China’s manufacturing capacity needs to be acknowledged by any policymaker or company developing an EV strategy. Chinese-made EVs present an opportunity for those countries seeking to leverage trade to expand the domestic supply and a challenge for those with hopes of developing a domestic value chain. At the same time, several governments are actively seeking to attract Chinese investment in the EV value chain in hopes that it can help develop local value chains. This trend is not isolated to emerging markets, as debates in the European Union over Chinese investment and tech transfer demonstrate.¹ More analysis is needed on what policies are most effective, whether Chinese investments can catalyze a broader innovation ecosystem, and how countries can achieve resilient and diversified supply chains, including targeting non-Chinese investors. The biggest obstacle is that few non-Chinese companies are producing affordable EVs at scale for consumers in middle- and lower-income countries, although that could change, especially if Indian and Vietnamese producers are successful.

Countries with existing manufacturing capacity and expertise have a clear comparative advantage in moving up the value chain thanks to existing industrial clusters and ecosystems through domestic and international investment. Countries lacking an existing base are far less likely to succeed in developing a domestic industry. These countries should carefully weigh the costs of pursuing a protectionist strategy without a clear path to successfully establishing a competitive industry, as it could be costly and have negative repercussions on the adoption of EVs.

In practice, few, if any, countries will have the ability to be leaders in every segment of the industry, meaning that companies and policymakers should strategically identify areas of comparative advantage to invest in and protect while facilitating access to other inputs that may be sourced internationally. Despite popular talk about deglobalization, global value chains remain important for most manufacturing processes, and most countries will continue to rely on imports to some extent. China's leadership across the value chain is not a model for other countries, as Chinese companies benefited from an early start in the industry, extensive industrial policy, and massive scale, which are hard-to-replicate conditions. Other economies will want to explore alternative solutions to address potential limits to domestic production and smaller markets, including international partnerships.

A growing domestic market is a strong tool of industrial policy, as it can help domestic producers achieve scale and attract foreign direct investment (FDI). Even countries seeking to pursue an export-focused strategy will find benefits from a larger domestic market, which can also help support the development of a component manufacturing ecosystem, among other economic benefits.

Finally, policymakers in Washington need to engage with these dynamics and recognize the ongoing technological transformation in the automotive sector, as well as China's growing role in the global automotive industry. While current U.S. policy has effectively shut out Chinese-made vehicles from the U.S. market, the rest of the world, particularly developing markets, is becoming more integrated with Chinese value chains. This could potentially leave the U.S. automotive industry more isolated and less competitive if no strategy is adopted to adapt to the coming transformation. However, other pathways are possible, but they will require more focus on innovation, a more granular understanding of risks and opportunities, and international partnerships that can result in more diversified value chains with positive effects for all involved. As a result, Washington will need to have a clear-eyed understanding of why many emerging markets are embracing EVs, why they are choosing to develop more extensive ties with Chinese automakers through both trade and investment, and what this means for U.S. soft power, market power, and the future of the mobility sector.

Introduction

The days when electric vehicles (EVs) were only a niche technology predominantly attractive to environmentally minded, wealthy consumers are gone.² Recent progress in EV and battery technology is reshaping the global automotive industry as well as oil markets, which have been a key determinant of geopolitics and wealth in the past century and a half. EVs are also a flashpoint in the energy transition because of the automotive sector's strategic role for many economies. In 2023, the global automotive industry was estimated to be worth \$3.5 trillion, roughly the same size as India's GDP.³ Although much recent policy analysis has focused on the Chinese market and those of developed countries, a new trend has commercial and geopolitical implications: the uptick in EV adoption in developing and emerging markets beyond China. These markets have largely been overlooked until recently, but the performance of EVs outside of developed countries has momentous implications for the energy transition, economic policy, and the internationalization of China's automotive sector.

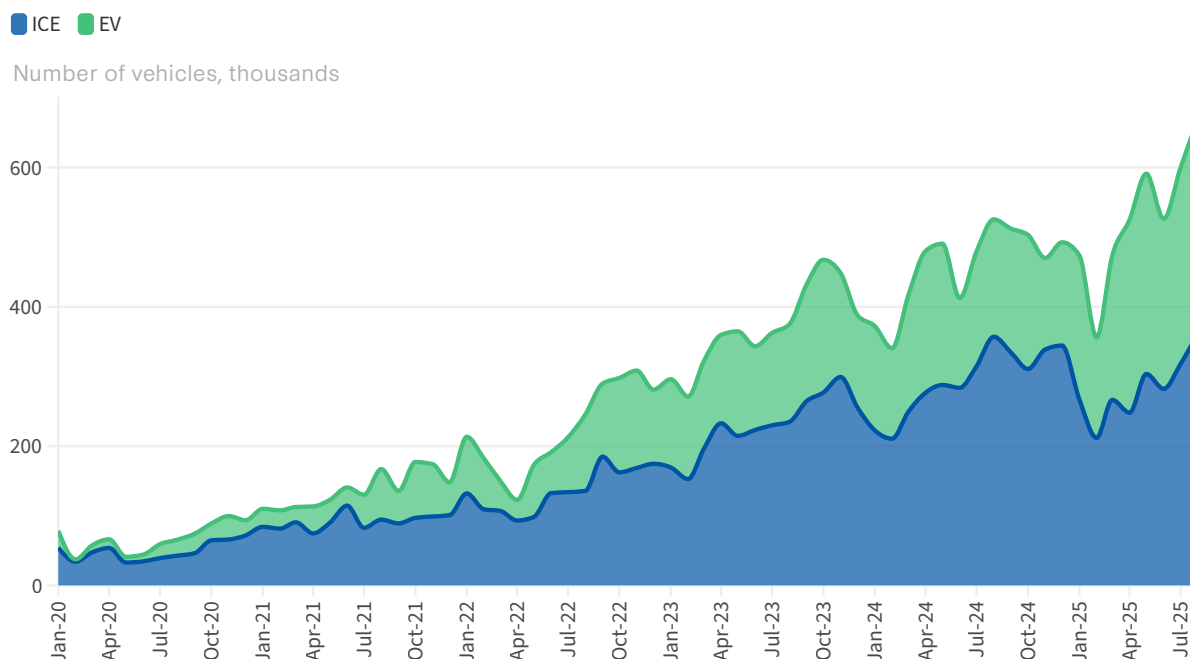
Two parallel developments are having an impact on how policymakers view the issue of the automotive sector's transformation. On the one hand, advancements in battery and EV technology have enabled the rapid diffusion of electric mobility in several key regions of the world, helping reduce greenhouse gas emissions, air pollution, and oil consumption. Oil imports account for a large portion of overall imports in several emerging and developing economies, affecting energy security and foreign currency reserves.

On the other hand, the EV transition will have an impact on countries' manufacturing sectors. Policymakers are hoping that by developing an EV industry they can move up the value chain and acquire new investments in next-generation technologies. However, the technological

transformation that holds the key to zero emissions brings with it disruption to incumbent players and established supply chains. This dilemma is felt most acutely by countries with existing automotive and auto part manufacturing capacity, including Brazil, Indonesia, India, Mexico, and South Africa, which are also among the largest emerging economies.

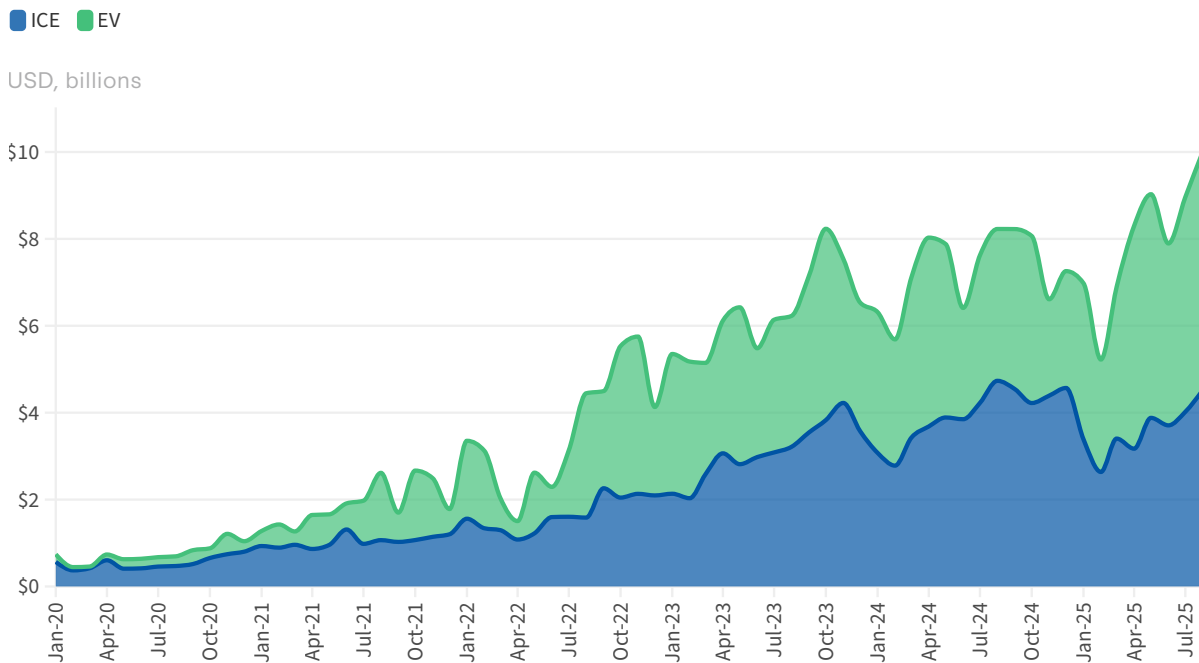
It is also impossible to discuss the EV transition without addressing the increased export flow of electric and internal combustion engine (ICE) vehicles from China since 2020 (see Figure 1). The wave of ICE vehicle exports, in part a result of the rapid transition to EVs within China, presents unambiguous challenges globally and threatens existing ICE vehicle production in emerging markets in particular. It is worth noting that ICE exports are not solely driven by Chinese brands and include vehicles made by non-Chinese original equipment manufacturers (OEMs) in China.

Figure 1a: Vehicle Exports from China by Type



Note: Electric vehicles include HS codes 870360, 870370, and 870380. ICE vehicles include all other HS codes under heading 8703.
Source: "Customs Statistics," General Administration of Customs of the People's Republic of China, accessed August 29, 2025, <http://stats.customs.gov.cn/indexEn>.

Figure 1b: Value of Vehicle Exports from China by Type



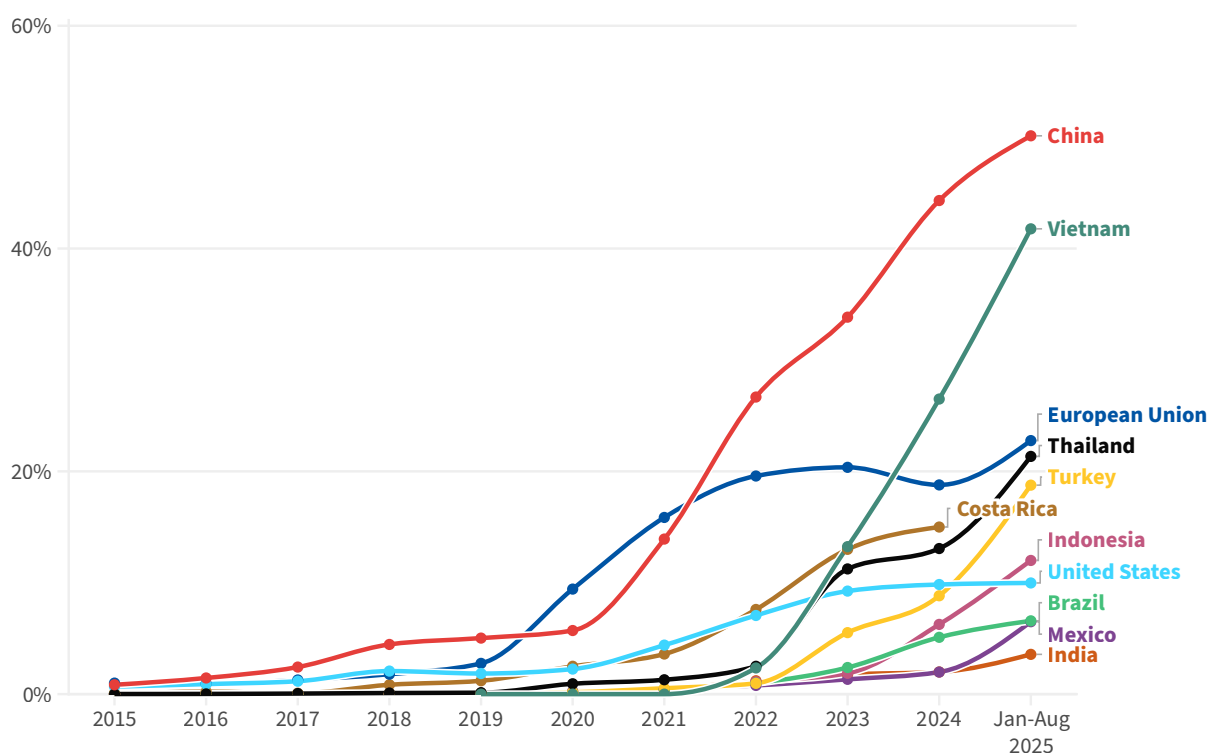
Note: Electric vehicles include HS codes 870360, 870370, and 870380. ICE vehicles include all other HS codes under heading 8703.
Source: General Administration of Customs of the People's Republic of China.

The increased outflow of EVs continues to grow even relative to ICE exports and is both enabling the transition and creating new dilemmas for policymakers who may be wary of increasing their dependencies on a country whose geostrategic influence globally has been expanding. Chinese companies are ubiquitous in the value chain for EVs and battery components, meaning that for most countries, climate policy is now at least in part linked to policy toward China, and more specifically trade with China. China's own success is also a poor model for other emerging economies, which are unlikely to be able to replicate the same conditions for success, including early entry in the industry, large-scale central and local government support, and the mobilization of massive demand within the country, in addition to international partnerships, investment in research and development (R&D), and existing manufacturing capacity. New lessons, however, can be drawn from countries such as Brazil, India, Indonesia, Costa Rica, Mexico, South Africa, and others that are currently engaged in EV policy.

Although, individually, automotive markets in emerging economies are small, in aggregate they are now key players in the EV transition. Emerging markets are also expected to be the main source of demand growth for cars in the coming decades, so trends today have long-term implications for the direction of the industry.⁴ Among the rising number of people who can afford to purchase a car, an increasing share is now considering an EV, and this is especially so for those who can afford two cars. The trend has long-term implications for consumers' lifelong preferences. Global surveys suggest that current owners of battery electric vehicles (BEVs) and plug-in hybrid vehicles (PHEVs) are highly likely to pick another EV as their next vehicle.⁵

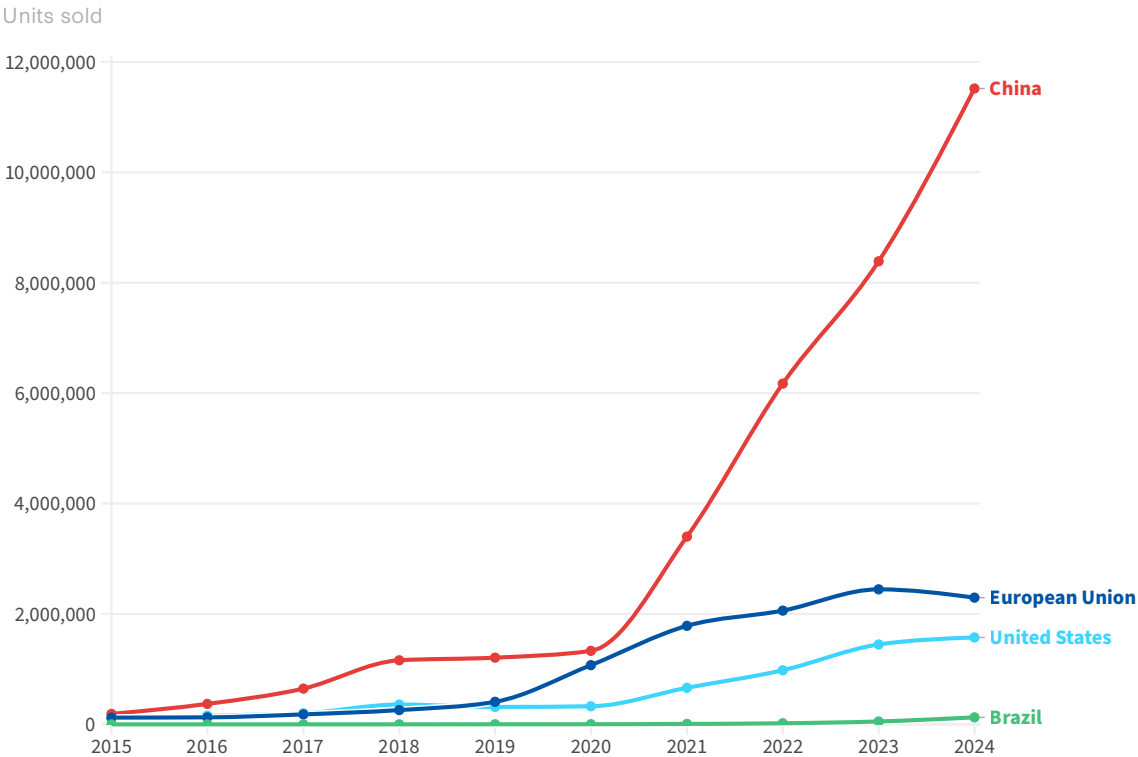
In several emerging markets, the transition in the transportation sector is taking place alongside that of developed economies, and passenger EV sales are increasing rapidly (see Figure 2). Although the stock of vehicles remains slower to change, because it depends on how often consumers purchase new vehicles and the used car market, the importance of fleets, such as taxis, in some middle-income countries suggests that change could happen rapidly. Fleet purchases largely explain the rapid rise in EV sales in Vietnam, for example. This might be compounded by the fact that car ownership rates are sometimes low in emerging markets. This creates a paradoxical situation: Within a country, the rapid adoption of EVs has transformational effects but might be overlooked internationally because the market is small. The result is that outside observers might not take note of a trend that could have long-term effects on countries' industrial development, oil demand, and ties to China, as well as greenhouse gas emissions.

Figure 2a: EV Sales as a Share of Total Car Sales in Selected Countries



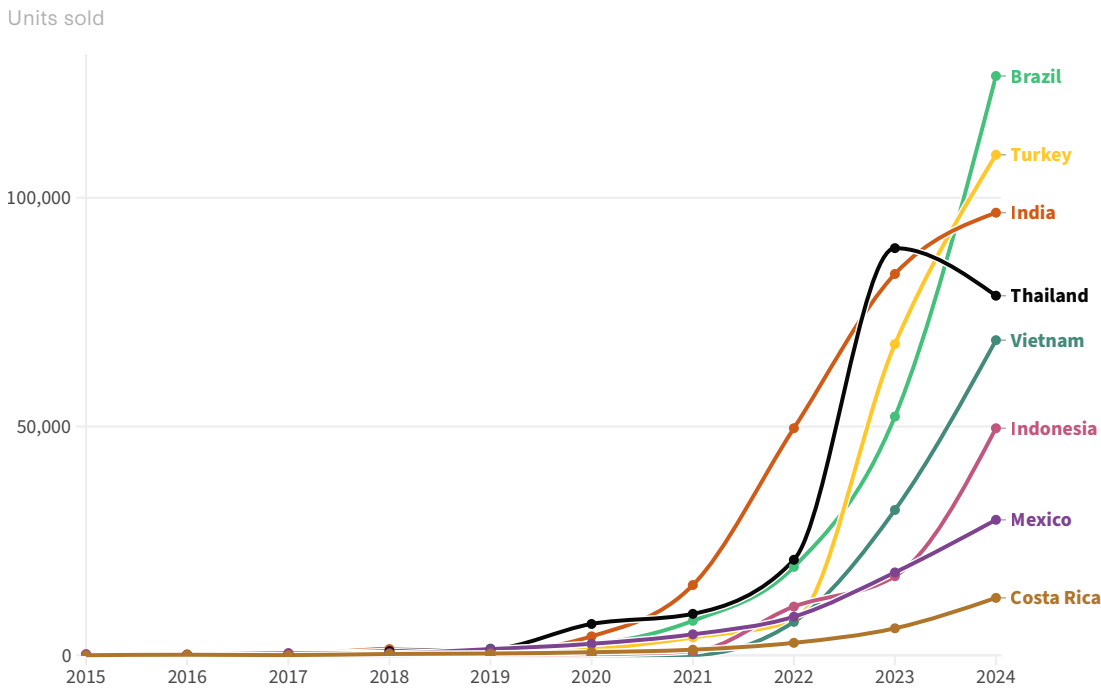
Source: "Global EV Outlook – August 2025 Update," EV Volumes, August 2025, <https://ev-volumes.com/#>; and "Global EV Data Explorer," International Energy Agency, last updated July 31, 2025, <https://www.iea.org/data-and-statistics/data-tools/global-ev-data-explorer>.

Figure 2b: Number of EVs Sold in Selected Countries Since 2015



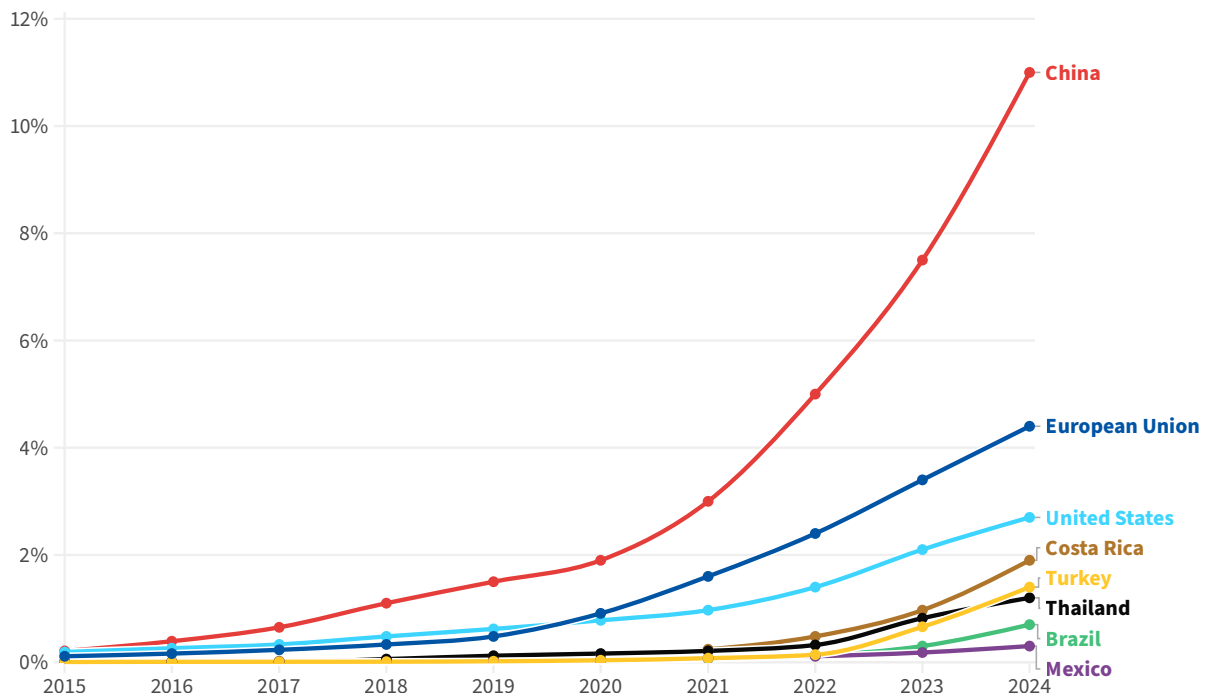
Source: EV Volumes.

Figure 2c: Number of EVs Sold in Selected Emerging Markets Since 2015



Source: EV Volumes.

Figure 2d: EV Stock Share in Selected Countries



Source: "Global EV Data Explorer," International Energy Agency.

This report will predominantly focus on the electrification of passenger vehicles, but the electrification of two- and three-wheelers and buses in several developing countries is in some cases happening at an even higher rate. This matters because in many emerging markets, such as India and Indonesia, electric two-wheelers are an attractive option for the emerging middle class. Electric buses are also increasingly popular, and very impactful in countries where a large share of the population depends on public transit. Despite the importance of these segments, they will not be discussed in this study as they reflect different dynamics and can develop independently, though they are worthy of future studies. For example, Chile is a bus electrification pioneer despite relatively low sales of private passenger EVs.

Most large emerging markets have established automotive manufacturing capacity and are growing in importance as global producers. In 2024, six out of the top fifteen countries in terms of light-duty automotive production (and one-fourth of total producers) were middle-income countries by the World Bank definition, according to data from the International Organization of Motor Vehicle Manufacturers (OICA).⁶ As such, governments in several large emerging markets are engaging in policy experimentation, introducing new industrial and climate policies and reevaluating existing ones.

To help policymakers and stakeholders better navigate the potential trade-offs and synergies between climate and economic goals in the EV sector, this report takes a comparative approach to identify best practices, criteria for decisionmaking, and potential outcomes. The research is based on extensive analysis of quantitative data, policies, and interviews with experts from emerging markets.

The Economic Dimension of the EV Transition

The energy transition, combined with rapid technological and geopolitical change, has confronted policymakers around the world with two related challenges: First, many legacy industries risk becoming obsolete or uncompetitive in the current global system. Second, there is an unprecedented opportunity to make economic gains through the deployment of and strategic investments in next-generation technologies.

The rise of EVs is perhaps the most high-profile test for how governments around the world will navigate the economic transition alongside the energy transition. The dramatic fall in the cost of electric vehicle battery packs over the past decade and a half—roughly 90 percent between 2008 and 2023—combined with rapid advances in the EV industry are providing unprecedented access to new zero-emission transportation options in multiple new markets.⁷

For some economies, the shift toward EVs presents limited structural economic challenges thanks to relatively strong infrastructure and a well-aligned political economy. As a result, some governments, such as Costa Rica's, face a relatively straightforward choice that mostly requires developing effective policies. Although some challenges by vested interests are inevitable, for these countries EVs are unlikely to pose a threat to core industries and may even bring some new opportunities. Indeed, Ethiopia, which has effectively banned the import of ICE vehicles to safeguard its foreign currency reserves, has shown that for some countries, shifting toward EVs can be a strategic choice. Similarly, Nepal, where in the last year EVs accounted for 76 percent of car sales, chose to shift to EVs to leverage its abundant hydropower resources and limit its reliance on imported oil.⁸ Moreover, for countries ranging from Costa Rica to the Netherlands, the presence of a domestic charging infrastructure industry has proven to be a powerful economic incentive. In the future, the growing importance of digital platforms and local data storage solutions for connected vehicles may provide new examples of industries that can benefit local players, even in countries without EV manufacturing capacity and that depend on imports.

Countries that have sought to increase EV adoption without expanding domestic production have done so mostly through open trade, which rapidly increases the supply available to consumers, largely by taking advantage of growing exports from China. For several large emerging markets, the political economy of the transition is more complex due to the interests of incumbent automotive producers, something familiar to those who have analyzed the issue in developed countries. Governments need to account for how the shift to EVs can affect domestic producers and jobs. On the one hand, the rapid growth in EV imports can threaten the domestic ICE vehicle industry and burgeoning domestic EV production. On the other, not taking action now to manage the shift toward new technologies could have long-term negative repercussions. Moreover, increasing exports of ICE vehicles from China due to large-scale overcapacity in the sector are translating to increasing competition for automakers globally regardless of the drivetrain. This is especially true given the projected phaseout of ICE vehicles in large markets like Europe, which could shrink the market for vehicles with tailpipe emissions significantly. It is also worth noting that the transformation of the automobile goes well beyond the electric drivetrain and includes the integration of digital platforms and autonomous driving.

There is also a geopolitical factor to consider: Some countries may want to balance their level of dependence on Chinese imports or seek more diversification in value chains for political reasons. Partly as a result of these dynamics, industrial policy has become top of mind for policymakers focused on achieving results for both climate mitigation and economic development, especially in the automotive sector. In a hotly contested global environment, countries are increasingly vying to attract investments and nurture domestic players through targeted policies with the aim of expanding their production capacity and upgrading their manufacturing base. In most cases it is too early to assess success, but some early trends suggest that the results are so far mixed, which is unsurprising given industrial policy's uneven record overall. Here again a paradox emerges clearly: Although having more global competition and affordable alternatives to Chinese EVs would be overall welcome by many governments, not all countries are going to be able to generate successful domestic EV OEMs with localized value chains.

As this report will show, in several cases growing domestic production is indeed supporting the transition domestically. However, there are constraints on whether industrial successes in one country can be replicated elsewhere. China's EV strategy has proven very successful, but it will be challenging to replicate in countries with smaller markets and more restricted budgets, especially since they are now competing with established Chinese companies. Similarly, local content requirements, which can be a tool to localize value chains, have had mixed results across regions and technologies.⁹ As a result, policymakers need to identify strategic advantages, set realistic goals, and adopt targeted tactics. The experience of other countries and sectors suggests that disciplining forces such as competition, sunset provisions for tariffs, or other forms of pressure to innovate (which in the automotive sector could, for example, include stricter emission standards) can be helpful in ensuring that subsidies are not used more efficiently by companies.

Overall, industrial policy has a mixed record on effectiveness and often requires extensive fiscal capacity, patient capital, and policy discipline.¹⁰ This may mean introducing mechanisms to create competition as well as sunset clauses so as to ensure that companies protected by industrial policy continue to focus on competitiveness. Some interesting examples of experimentation with tariff policies are in place in Indonesia, Thailand, and to some extent Brazil, but the focus for now is on attracting foreign investment rather than stimulating domestic players. India's support for manufacturing and charging infrastructure without providing incentives to reduce the upfront cost for private consumers has some drawbacks, but it also forces manufacturers to focus on cost reduction. However, it is worth remembering that overall, policy aimed at catalyzing domestic production can slow the transition if it reduces imports and at the same time fails to expand competitive domestic production.

Indeed, trade-offs are increasingly apparent as governments face soaring expenses, target multiple goals that may not all be consistent, and face complex economic security challenges without clear short-term solutions. Not all constraints are negative, however, as they have pushed some policymakers to think about innovative ways to achieve multiple goals with cost-effective solutions, such as attracting foreign investment by providing access to their growing market. Industrial

policy can take various forms and policymakers need to identify the best formula that meets their country's advantages and constraints.

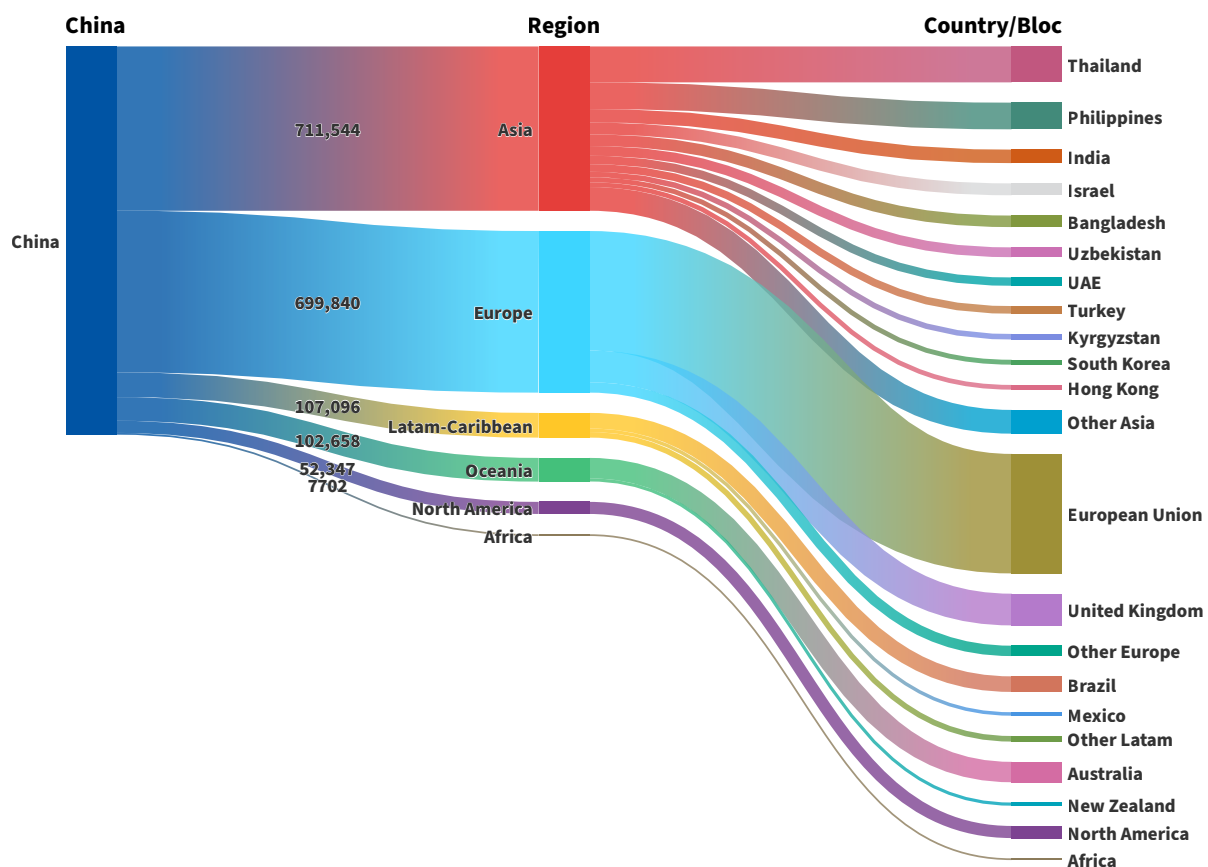
Although domestic policy is important, international trends outside a government's control can sometimes also have unexpected effects. For example, perhaps the most important trend with implications for the adoption of EVs globally, and for the success of many countries' efforts to develop a domestic industry, is the increasing global competition in this sector and the outsized importance of Chinese production.

The China Factor

The surge in Chinese automotive exports and particularly EV exports has been especially transformative for developing and emerging markets, whose demand potential for EVs was largely underestimated.

Figure 3a: EV Exports from China by Region/Country, 2024

Number of vehicles



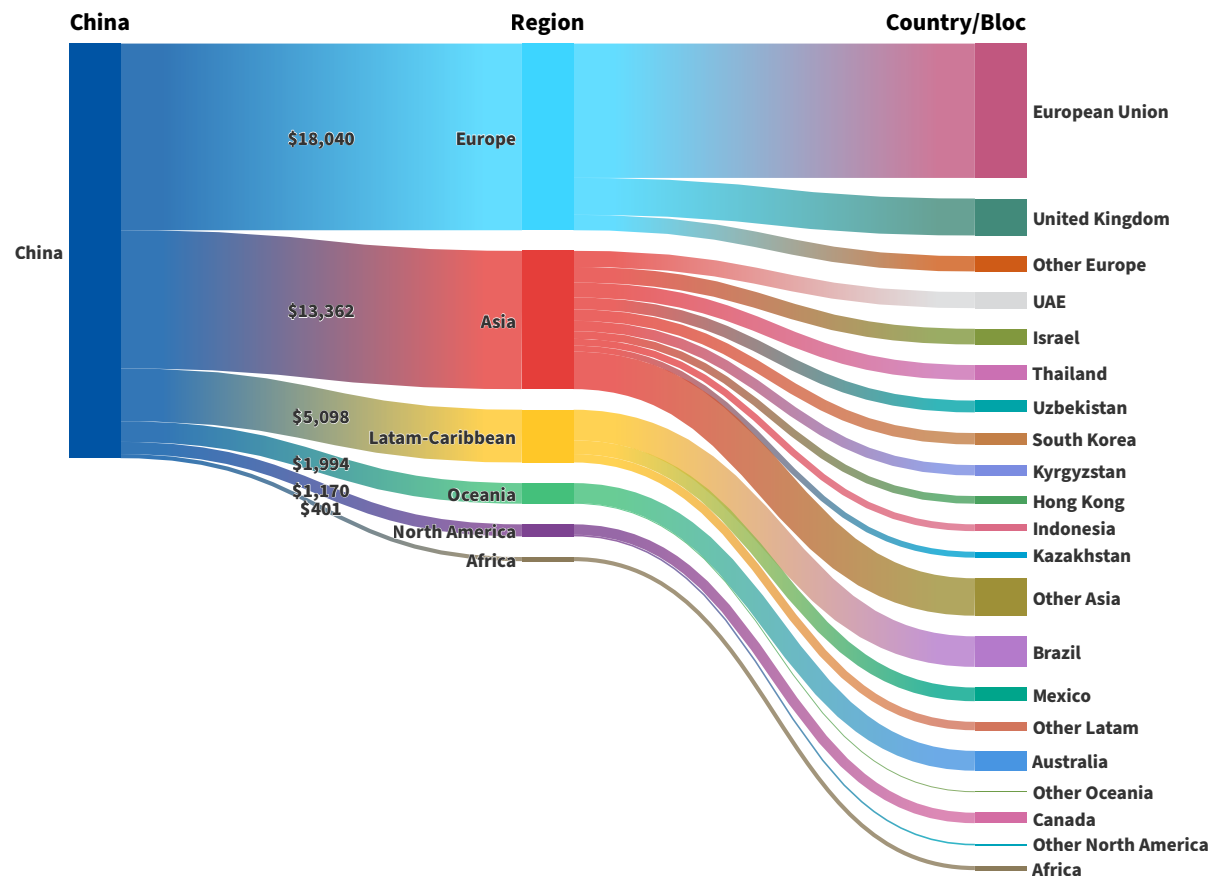
Note: Includes only passenger vehicles. HS codes used for EVs are 870360, 870370, and 870380.

Source: General Administration of Customs of the People's Republic of China.

Indeed, emerging and developing markets have become increasingly important destinations for Chinese EV exports (see Figure 3). Domestic trends in China, where producers have been locked in cutthroat competition for years with negative effects on profit margins and sustainability, mean that companies have been increasingly seeking to expand their overseas sales. Chinese automakers appear to have embraced a strategy of exporting everywhere regardless of the size of a market. As a result, for many developing markets, Chinese-made EVs drive sales growth. For example, according to data from EV Volumes, a specialized research company tracking the global EV market, Chinese-made EVs accounted for around 85 percent of new EV sales in Brazil in 2024.

Figure 3b: EV Exports from China by Region/Country, 2024

USD value, millions



Note: Includes only passenger vehicles. HS codes used for EVs are 870360, 870370, and 870380.
Source: General Administration of Customs of the People's Republic of China.

China's EV export boom has created ripple effects in various ways. Countries with reduced trade tariffs on EVs have seen rapid domestic uptake thanks to increased choices for consumers and competitive international prices, especially for Chinese-made models. This is true for recent high-income countries like Costa Rica; upper-middle-income countries such as Brazil; and lower-middle-income countries such as Nepal, for example.

The surge in automotive exports from China has raised alarm bells in countries concerned about their domestic industry. This has led several governments to introduce or reintroduce tariffs to slow down the rapid increase in imports. Although cars have been one of the most high-profile sectors to experience export growth from China, competition in other sectors, ranging from petrochemicals to steel, has contributed to a more general state of concern for many policymakers.¹¹

However, concern over trade in some cases is matched with keen interest toward attracting more investment. Several countries have matched trade protection policies with policies or signals of openness toward more foreign direct investment (FDI), especially from China. The International Energy Agency (IEA) estimates that 5 percent of sales in emerging markets are already supplied by overseas manufacturing capacity from Chinese manufacturers, and this is set to grow significantly in the coming years.¹²

While this could be an advantageous arrangement, the sheer number of countries that are under reported consideration for investment by Chinese EV companies has created a new type of competition. This is particularly true of BYD, which is the largest EV manufacturer globally and the largest exporter of EVs from China. It is not only emerging markets that are vying to attract Chinese factories; several EU member countries have been openly courting Chinese firms as well.¹³ Meanwhile, it is unclear if Chinese companies will be able to deliver on all their promises as their investments plans are stretched thin. Moreover, Beijing is introducing new export controls on technologies used to make lithium iron phosphate (LFP) batteries, suggesting it may restrict technology transfer and introduce mechanisms to control what kinds of manufacturing Chinese companies do abroad.¹⁴

As more countries make moves to protect their automotive industries, scrutiny over imports, especially those from China, will likely increase. Third countries are also likely to come under more pressure due to concerns in the United States, Europe, and other developed economies over transshipment and tariff avoidance. This is already complicating supply chains for established automotive manufacturers who will be less able to take advantage of economies of scale, but it may also undermine automotive development strategies that are primarily dependent on exports. The European Union is a particularly attractive export market for Chinese-owned factories located in emerging markets. However, should export volumes from Chinese manufacturers in countries such as Thailand increase significantly, it appears unlikely that the European Commission would not take action to protect European production.

Not all progress in EV adoption and industrial production in developing markets has been driven by Chinese automakers, however. Several countries, such as Vietnam, India, and Turkey, have homegrown EV manufacturers with global expansion plans. However, sales and production volumes are still relatively small, and components, such as batteries or battery components, are often sourced at least in part from abroad—mostly China. Even components not sourced from China often require machinery made in China or intellectual property licensed from Chinese firms. The role of global value chains and components highlights the persistent importance of trade to achieve domestic industrial strategies and China's central position in the automotive innovation ecosystem. Any industrial strategy will need to recognize the reality of how current value chains are distributed

and China's leadership position within them. It also needs to confront what risks are associated with various levels of dependence. Trade of key components may be deemed more of a risk compared to making them locally but using some Chinese intellectual property.

Reconciling Divergent Domestic Policy Priorities and International Trends

There are clear climate, environmental, and public health benefits attached to EVs, which have made them popular in many countries.¹⁵ Policymakers often consider environmental and climate goals alongside the pursuit of expanded manufacturing, value chains, and job creation.

This report aims to provide a framework to assess trade-offs and opportunities for a country relative to global trends and realistic expectations, as well as to provide a comparative overview of how different countries have already been navigating transformations in the sector. Important factors to consider are domestic conditions, including the manufacturing ecosystem and market demand, as well as international trends. For example, global manufacturing overcapacity and the fragmentation of global regulation on connected and electric vehicles may complicate the ability of new automakers to break into new markets. Meanwhile, excessive competition within China has lowered average firm profitability, putting the entire industry at risk.

The following chapter aims to provide an overall framework for understanding EV trends in emerging economies; the subsequent chapters offer a case study analysis of six different markets and an overview of other notable cases. The report concludes by offering several lessons for policymakers on how countries can achieve economic and climate outcomes in the EV transition.

Understanding the Automotive Sector's Transformation in Emerging Markets

There are several ways to categorize countries' automotive sector strategies, and the characteristics of the traditional approach toward ICE vehicles often have implications for the EV sector. As noted before, this report only focuses on passenger vehicles and light-duty vehicles.

Most countries import the majority of cars that are sold domestically. For these countries, job creation and value added in the automotive sector lie in the service sector, including sales and maintenance. These countries, which are often relatively small, are set to benefit the most from the current surge in EV exports from China and elsewhere, as they can rapidly import vehicles with limited disruption to core industries. There may still be job losses, especially if the workforce is unable to upskill in order to work in post-sale services and maintenance and repair, opportunities for which are generally expected to be more limited since EVs require less maintenance. However, these are not as fundamentally challenging to a country's overall economic structure.

Although EV adoption may make sense strategically in these economies, there are still constraints to adoption, which can range from reliability of the electric grid to the lack of adequate charging infrastructure. Yet, in several cases, an increase in options for consumers has resulted in a significant expansion in relative initial demand, defying expectations.

Although most countries do not have significant automotive manufacturing sectors, many medium and large economies, including those categorized as middle income by the World Bank, do have manufacturing sectors that include automotive assembly or component manufacturing. All middle-income countries in the G20, for example, have an automotive manufacturing sector.

These are the countries for which the transition to EVs holds both promise and peril, as it requires an industrial transformation that entails winners and losers. There are several distinguishing characteristics for countries in this category. Most emerging markets have experienced what scholars Doner, Noble, and Ravenhill define as extensive growth of the automotive industry, or automotive and component assembly largely associated with FDI from foreign manufacturers.¹⁶ Brazil, Thailand, Mexico, Morocco, South Africa, and Indonesia all fall in this category. However, there are countries like India that have sought to pursue an intensive growth model focused on developing domestic value chains alongside openness to some FDI. China is perhaps the most recent case of a developing country successfully shifting toward an intensive growth strategy for its automotive sector and beyond, following in the footsteps of South Korea and Japan.

The EV sector offers some new pathways for countries to position themselves in the global automotive value chain. For example, Vietnam's automotive manufacturing sector is limited, but VinFast, a domestic company, has leveraged Vietnam's broader manufacturing ecosystem, has been performing strongly in the domestic market, and is expanding internationally. Morocco has become a major assembly hub for ICE vehicles and components only in the past decade and has leveraged its position to attract extensive investments in the battery value chain to serve the European and U.S. markets.

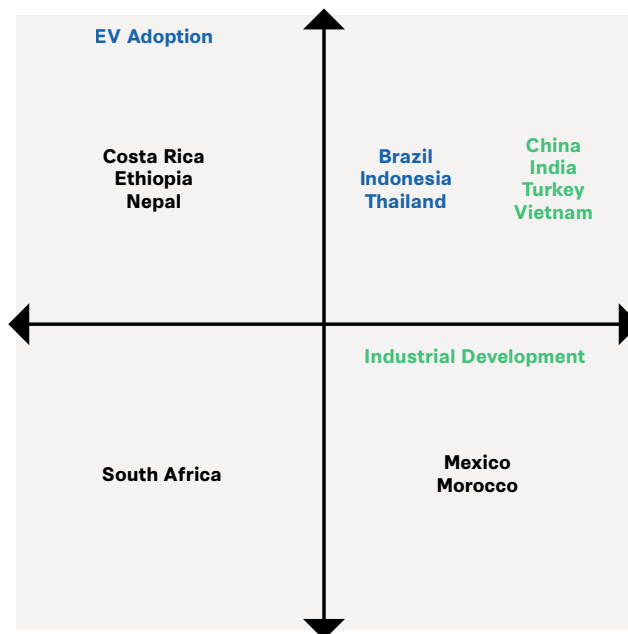
However, for the most part, new supply chains tend to build on top of existing expertise. This was certainly the case for China, for example. Thailand is a major assembly hub for international ICE vehicle brands and is now becoming an assembler of EVs, largely Chinese brands. Brazil, Mexico, and Indonesia, which also have FDI-dependent automotive sectors, are in the process of acquiring new investment in EV manufacturing from foreign companies. India, the world's most populous country, is also a large car producer, with several successful domestic firms that have become advocates for the EV transition, which they hope may position them to compete more effectively with the popular foreign brands known for their ICE models.¹⁷ Turkey, which has been a manufacturing base for foreign companies seeking to export to Europe, has also seen the rapid rise of a domestic EV producer, Togg, which plans to expand internationally. Like VinFast in Vietnam, Togg has benefited from existing manufacturing know-how in the country.

The implication of this trend is that countries that have no existing manufacturing experience, particularly in the automotive value chain, are significantly less likely to emerge as major producers, although some limited opportunities may exist in leveraging access to resources such as lithium, or domestic markets.

Given the factors discussed above, there are at least four different categories that can be used to describe countries' current EV strategies and performance (see Figure 4). There are countries that have experienced rapid expansion in EV adoption with relatively little advancement in manufacturing (upper-left quadrant). The lack of manufacturing growth should not be seen as a negative outcome; in most cases, it is the result of an explicit prioritization of adoption over localization of value chains, as it would be disproportionately costly and challenging for these countries to establish a significant manufacturing presence. As noted before, there are often other economic and socio-environmental benefits these countries are seeking from the electrification

of transportation. For the most part, Chinese exports are playing a major role in enabling the transition in these countries.

Figure 4: Indicative Matrix of Country EV Industrial Strategies and Performance



Source: CSIS Trustee Chair in Chinese Business and Economics.

Next, there are countries that have experienced some growth in EV adoption alongside some growth in production (upper-right quadrant). These countries are in many ways at the crux of the industrial transformation taking place and are adopting a variety of new policies to pursue their objectives. In some cases, these countries' strategies largely hinge on local companies that leverage global value chains (shown in green; this reflects an intensive growth strategy), but in many situations the extensive growth strategy used in the ICE vehicle sector is replicated for EVs (see countries in blue). Several of the countries in this category are actively seeking to attract foreign direct investment, which so far has been most forthcoming from China.

These labels are meant to provide an analytical frame but can miss the complexity of value chains; indeed, many countries with an intensive growth strategy also benefit from FDI. Overall, in this quadrant, domestic manufacturing expansion is correlated with a growing domestic market, which can attract foreign firms and is leveraged by domestic companies to achieve scale and maturity.

The lower two quadrants represent countries that have been slower in adopting EVs. In the lower-right quadrant are the countries that have been slow to adopt EVs domestically but produce EVs or battery components for the export market. There are very few countries that fit this description, because it requires rare levels of value chain integration with large markets, but the two principal examples are Morocco and Mexico, which supply the European Union and the United States, respectively.

Mexico is a particularly striking case because of the size of its industry, and its position in the quadrant may shift if trends from the first half of 2025, which suggest a surge in EV sales, stay strong. However, at the moment, most domestic car sales in Mexico are imported largely from China, while domestic production is meant for consumers north of the border (see the report's section on Mexico). A purely export-driven strategy can put economies in a vulnerable position: As U.S. policy on EVs is reversed and the Trump administration becomes more focused on reducing imports, some investments in Mexico to produce EVs may come under threat.

Finally, the lower-left quadrant shows countries that have shown little progress in either production or sale of EVs. South Africa is certainly not the only country that falls in this category; indeed, many middle- and lower-income countries are in this position. However, South Africa does have an automotive manufacturing industry that is likely to come under some pressure in the coming years as it competes with low-cost manufacturing from China and as demand for ICE vehicles lessens in Europe, due to the ban on new ICE vehicle sales scheduled to start in 2035.

How Emerging Markets Are Responding to the EV Transition

Six Case Studies

To better explore how different emerging markets are positioning themselves across the EV value chain and what strategies they are adopting relative to EVs, the report will delve into six case studies that reflect a variety of approaches.

Costa Rica

Costa Rica has never been home to a major automotive industry, and local production remains confined to a limited series of auto parts.¹⁸ The country also has a small auto market, with only around 73,000 passenger vehicles sold in 2024.¹⁹ However, its small size and importer status make it a useful case study, as it reflects the reality for many countries around the world that are dependent on imports and technologies developed abroad in the automotive sector. Costa Rica's government has been pragmatic in leveraging a rapidly developing global EV industry to pursue its own policy goals. It is also worth noting that Costa Rica, although still generally considered an emerging market, has also recently achieved high-income status, unlike the other countries discussed in this report, which are all still categorized as middle income by the World Bank.

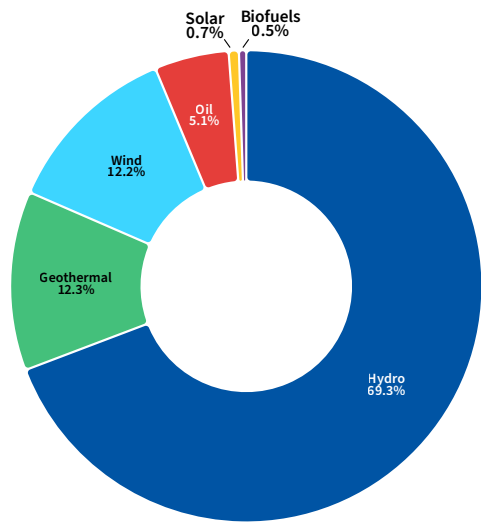
EV POLICY IN COSTA RICA: ADOPTION THROUGH OPENNESS

Costa Rica's EV policy is part of its larger climate policy agenda, which has a high political salience in the country. As part of its participation in the Paris Agreement, Costa Rica has committed in its nationally determined contribution (NDC) to reaching carbon neutrality by 2050. Included in Costa Rica's 2020 NDC are several goals related to transportation, including a 27 percent reduction in transport-related emissions by 2030 and an 8 percent electrification rate for light vehicles.²⁰

Such goals are key to Costa Rica’s overall climate goals, as transportation made up 75 percent of energy-related CO₂ emissions in 2022.²¹

Costa Rica’s oil imports are also a concern: They increased 73 percent between 2000 and 2023 as the country developed economically and its vehicle fleet expanded.²² Given the country’s significant investments in clean energy and the fact that nearly 85 percent of total electricity generation in 2023 was produced by renewables like hydropower, wind, and geothermal power (see Figure 5), vehicle electrification also presents a strategic opportunity to increase energy self-reliance and decrease exposure to global commodity markets.

Figure 5: Share of Costa Rica’s Electricity Generation by Technology Type, 2023



Source: “Costa Rica: Energy Mix,” International Energy Agency, <https://www.iea.org/countries/costa-rica/energy-mix>.

One interviewee also explained that in Costa Rica, the presence of a domestic charging industry has also helped support a complementary industry with broader economic benefits and provided a tangible example to consumers of how the country benefits from the transition.

Table 1: Tax Exemptions Included in Law 9518

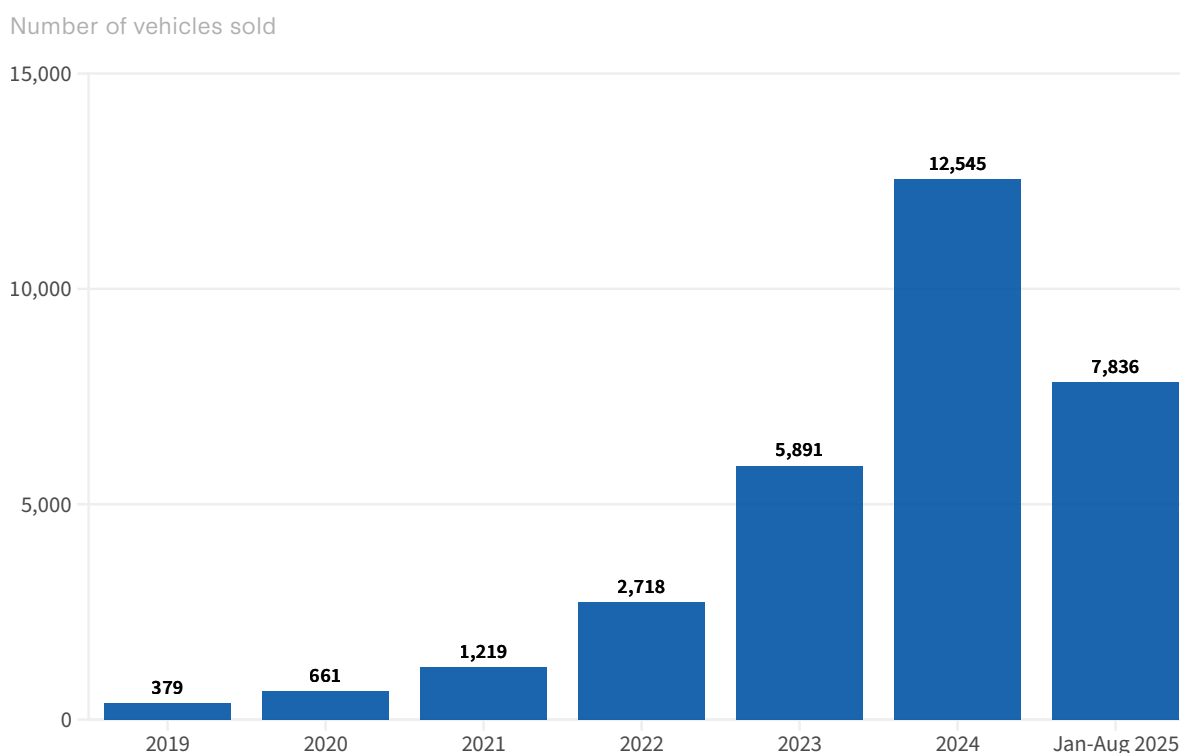
Cost in Freight Value Range (USD)	General Sales Tax	Selective Consumption Tax	Customs Tax
\$0 – \$30,000	100%	100%	100%
\$30,001 – \$45,000	50%	75%	100%
\$45,001 – \$60,000	0%	50%	100%
Over \$60,000	0%	0%	0%

Note: The customs tax exemption was changed to 75 percent in May 2025.
Source: “Incentives for the Promotion of Electric Vehicles (Law 10209 from 2022 Modifying Law 9518 from 2018),” International Energy Agency, last updated September 4, 2025, <https://www.iea.org/policies/2973-law-9518-incentives-and-promotion-for-electric-transport>.

Costa Rica’s most consequential EV policy has been its Law 9518, which was introduced in 2019 and promotes the electrification of transport by offering an expansive array of tax exemptions.²³ The law includes sales tax, consumption tax, and tariff exemptions aimed at making EVs more affordable (see Table 1). Given that import tariffs on new and used vehicles usually range from 30 to 50 percent, these measures create strong incentives to switch to EVs.²⁴

The law worked—EV sales grew 33-fold from 2019 to 2024 according to data from EV Volumes (see Figure 6), largely due to increasing price parity between EVs and ICE vehicles sold in the country. There have also been regulatory changes such as the green license plate initiative—similar to policies in China—that provide wider access to public parking and serve as a visual reminder of EVs’ growing prominence.²⁵

Figure 6: EV Sales in Costa Rica



Source: EV Volumes.

More recently, in May, the Costa Rican government announced that it would reduce selective consumption tax exemptions to a rate of 7.75 percentage points, or about one-fourth of the usual 30 percent tax rate, after several years of exemptions as a part of Law 9518.²⁶ The exemptions introduced in the law were always intended to be temporary, and the government has said it will maintain this rate until 2028.²⁷ While the increased tax has caused some short-term reductions in sales, Costa Rica’s sales in the first half of 2025 remained high.

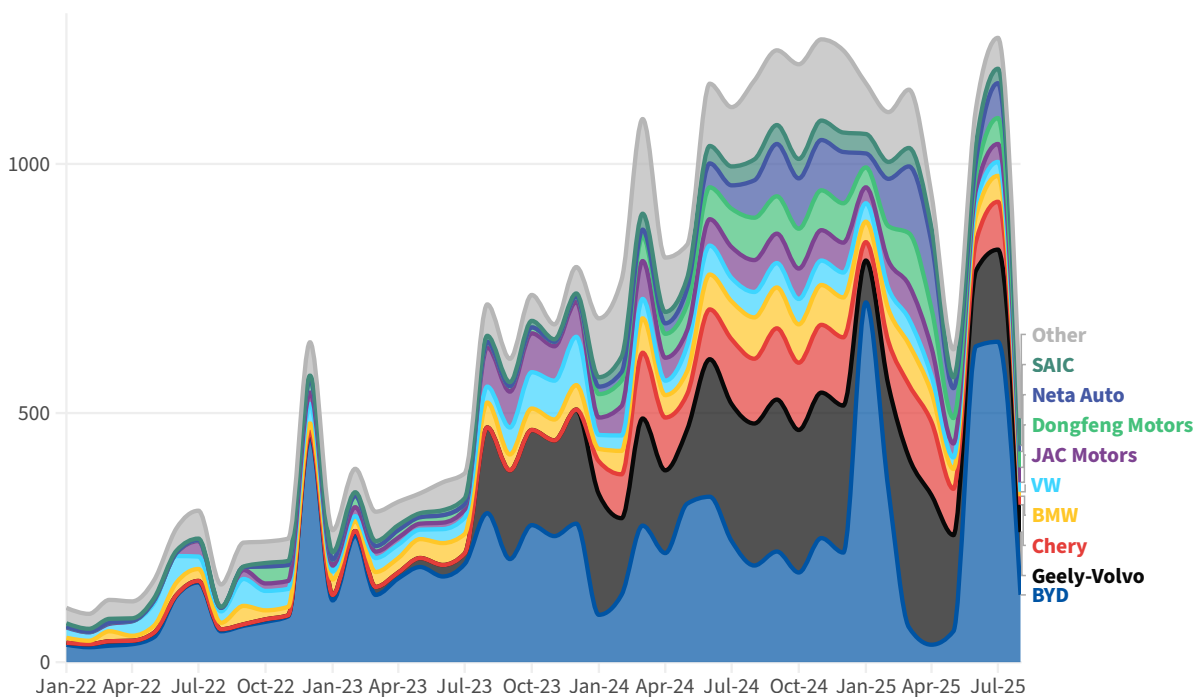
COSTA RICA'S PASSENGER EV MARKET: SMALL AND RAPIDLY EVOLVING

Although 12,500 is a relatively small number of vehicles, for a market the size of Costa Rica's, the number of sales is impressive. Chinese cars have been particularly important, with Chinese-made EVs accounting for over 73 percent of all EVs sold from 2019 through the first half of 2025, according to EV Volumes. Chinese-made vehicles also accounted for around 85 percent of the year-on-year growth in EV sales in 2023 and 2024, meaning that it was largely Chinese-made vehicles driving increased adoption. In both cases, the majority of sales were of Chinese-owned brands, with BYD, Geely-Volvo, and Chery being the largest brands in Costa Rica.

One notable feature of Costa Rica's market has been the sheer diversity of players driving its EV sales (see Figure 7). In 2024, the company with the largest sales share, BYD, had only 21 percent of the market, with Geely (19 percent), Chery (11 percent), and Dongfeng (6 percent) also being large players. Compared to other markets where often one to three large companies dominate, Costa Rica stands out. Part of this can be attributed to Costa Rica's size; in a small market, a small number of cars can represent a relatively large share. Interviews conducted by the CSIS research team also pointed to the fact that individual Costa Rican consumers often arrange directly for the import of the vehicles they wish to buy, which has expanded the variety of electric brands and models in the country, and greater competition has led to lower prices.

Figure 7: EV Sales in Costa Rica by Original Equipment Manufacturer (OEM) Group, January 2022–August 2025

Number of vehicles sold



Source: EV Volumes.

IMPLICATIONS AND FUTURE OUTLOOK

Costa Rica serves as a reminder that many countries in the global auto market are price takers and are reliant on imports of vehicles. These countries are already net importers of ICE vehicles, and although the origin of their cars and the technology under the hood of those vehicles may change, their basic dependence on trade will likely not fundamentally change. In fact, EVs might help a country's balance sheet by reducing its reliance on imported oil, something that countries such as Nepal and Ethiopia are actively pursuing. A domestic charging infrastructure industry can also provide new economic opportunities that are complementary to growing imports of EVs. There are limits to the replicability of Costa Rica's model, given its abundant supply of clean energy and the country's small size, but it provides a useful example of how some countries may navigate, and benefit from, the EV transition.

One last lesson from the Costa Rica case study is that EV imports from China may increase rapidly regardless of a country's strategic outlook or alignment relative to the United States. Costa Rica's diplomatic relations with China have been mixed, despite having shifted recognition from Taiwan to the PRC in 2007. Costa Rica's trade and diplomatic relationship with the United States is overall far more important. However, in the absence of direct commercial competition with domestic production, the government is less likely to view trade as a problem. This is inherently different from situations that involve investment, as will be seen in the other case studies.

Brazil

Among developing economies, Brazil is notable for having both a large auto industrial base and a large domestic market: Brazilian auto manufacturers produced 2.5 million vehicles in 2024, making it the eighth-largest manufacturer of vehicles worldwide, and 2.63 million vehicles were sold in the country the same year, making it the sixth-largest global auto market. The industry is important to Brazil's economy, accounting for 5 percent of GDP and providing 1.3 million direct and indirect jobs according to ANFAVEA, the country's leading automobile trade association.²⁸

Since the earliest days of the auto industry, Brazil has been integrated into global supply chains and has exclusively relied on foreign investment for its domestic industry. In the early part of the twentieth century, this was exemplified through investments by American automakers Ford and General Motors in São Paulo.²⁹ Brazil continues to benefit from significant FDI in the automotive sector thanks to its relatively important market and its key position as the economy with the largest manufacturing sector in South America. Today, companies with factories in Brazil include GM, Volkswagen, Toyota, and Stellantis, among others.³⁰ Some OEMs, such as GM, even have R&D centers in the country, often focused on flex-fuel vehicles that can use biofuels in addition to regular gasoline, which are popular in Brazil. The auto manufacturing industry also supports a large network of local parts suppliers.

EV POLICY IN BRAZIL: TENTATIVE SUPPORT

The most high-profile policy adopted by Brazil to support the transformation of its automotive sector has been MOVER (an abbreviation of the Portuguese name, Mobilidade Verde e Inovação, or Green Mobility and Innovation), itself part of a broader industrial policy agenda known as

New Industry Brazil (NIB). MOVER, which was originally passed in 2024, consists of a variety of provisions, including standards for both domestically produced and imported vehicles, R&D incentives for the mobility and logistics industries, and the establishment of a national fund for industrial and technological development. The program is expected to provide R\$19.3 billion (around \$3.6 billion) in funding between 2024 and 2028.³¹ Overall, MOVER's stated objectives are to support "technological development, global competitiveness, integration into global value chains, and decarbonization."³²

MOVER is notably a technology-neutral policy agenda. For example, it includes a tiered approach to the Tax on Industrial Products (IPI), imposing different tax rates based on a vehicle's emissions. In practice, this is intended to make more sustainable vehicles more affordable. However, interviews with experts conducted by the CSIS research team highlighted that the biofuel industry is a particular priority for the government—a result of Brazil's large and influential agricultural sector. For example, the provisions in MOVER make specific references to "promoting the use of biofuels, other low-carbon fuels and alternative forms of propulsion," clearly identifying biofuels as a policy target alongside alternative forms of propulsion, which include EVs.³³

Overall, MOVER's main contribution has been to create supply-side incentives for more energy-efficient vehicle production, including electric vehicles. The plan offers financial credits to companies investing in R&D and industrial production that can be used to offset federal taxes. It also provides financial credits for companies relocating industrial production to Brazil from outside the country. The credits are equal to the import tax levied on the transfer of production cells, which includes machinery and equipment, including for testing and R&D. Moreover, MOVER includes corporate tax breaks on export revenues from products and systems developed in Brazil.³⁴ It is worth noting, however, that the policy's technological requirements are not particularly ambitious and likely are not strict enough to require automakers to produce EVs—many automakers will just have to make more efficient ICE vehicles.

On the demand side, the federal government has not undertaken significant initiatives, but some state governments within Brazil have introduced preferential tax regimes for the IPVA (Imposto sobre a Propriedade de Veículos Automotores), or an annual vehicle tax to incentivize green vehicle adoption. These range from relatively minor exemptions to total exemptions, depending on the region. Several states require that vehicles be produced within the state, limiting eligibility.

As will be discussed more in-depth in the next section, the policy that has been most effective in expanding the Brazilian market is one that has to do with trade, namely Resolution No. 97, rather than domestic subsidies.

BRAZIL'S PASSENGER EV MARKET: INCREASING AGAINST THE ODDS OR HEADED FOR A CEILING?

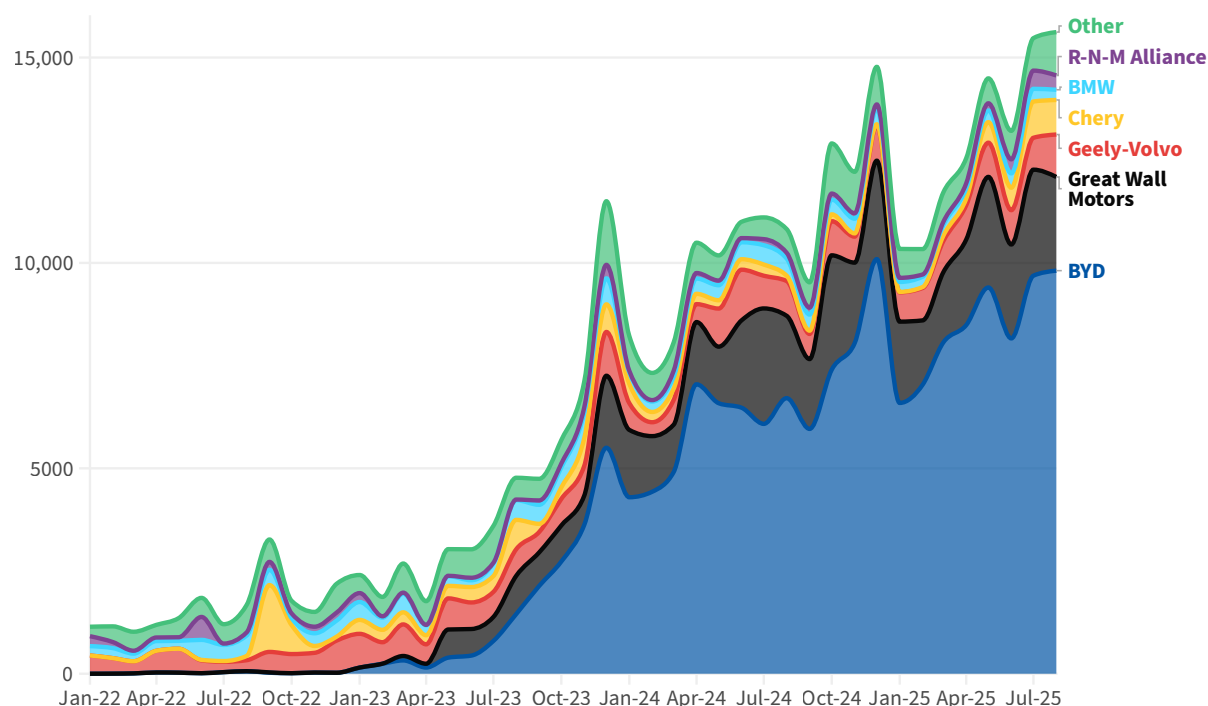
Brazil has seen one of the most rapid increases in EV sales globally between 2022 and 2024. According to data from EV Volumes, the EV sales share jumped from less than 1 percent in 2022 to 5 percent in 2024 and had reached 6.5 percent for the first seven months of 2025, despite the lack of federal tax credits or incentives for EV buyers.³⁵ The data shows that the growth in sales

was driven by the entrance of Chinese manufacturers during a window of relative trade openness. Brazil experienced a more than 2.7-fold increase in EV sales from 2022 to 2023, and around a 2.4 fold increase from 2023 to 2024. Chinese-made vehicles accounted for over 103.1 percent of EV sales growth from 2023 to 2024, meaning that in practice not only did Chinese-made vehicles account for the bulk of the growth in sales, they may have also displaced sales of some EVs produced in other regions of the world.

Far and away the largest market entrant has been BYD, which accounted for 62 percent of the country's EV sales in 2024 and 66 percent in the first half of 2025, according to data from EV Volumes. Other Chinese manufacturers have also proven successful, with Great Wall Motors and Geely-Volvo holding 18.0 percent and 6.8 percent of the market, respectively, in 2024 (see Figure 8).

Figure 8: EV Sales in Brazil by OEM Group, January 2022–August 2025

Number of vehicles sold



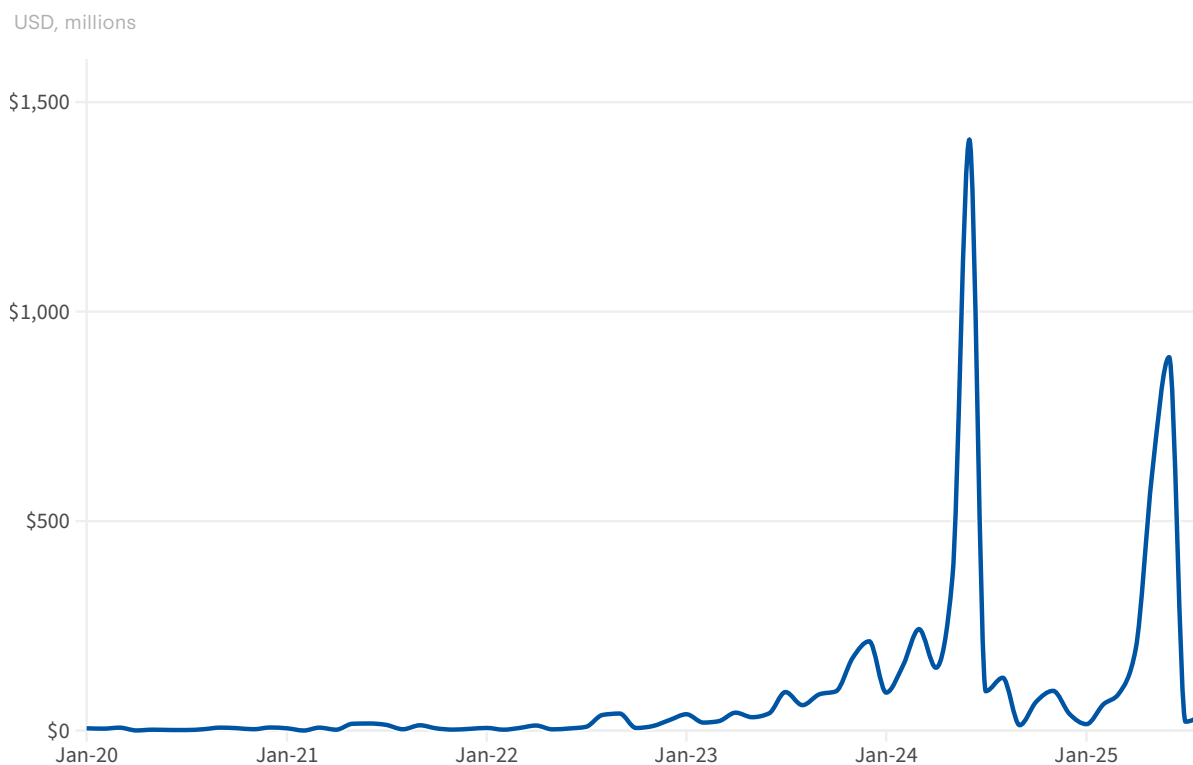
Source: EV Volumes.

Mass-market models such as BYD's Song Pro and Dolphin Mini (sold as the Seagull in other markets) and the Haval H6, produced by Chinese firm Great Wall Motors (GWM), have proven particularly successful in Brazil's market. All data points to affordable models such as these unlocking new demand in Brazil. For example, Brazil's best-selling EV in 2021 was the Volvo XC60 plug-in hybrid model, which retailed for around R\$372,200 in 2021 (around \$70,000) and sold just above 2,000 vehicles.³⁶ The top-selling model in 2024, the BYD Song Pro PHEV, had a median price of around R\$162,000 (around \$30,000) as of August 2025.³⁷ While there is still a significant price premium

relative to the cheapest ICE models on the market, the Song's price is relatively close to the average price of passenger vehicles sold in Brazil.³⁸

This remarkable surge in Chinese-made vehicles was enabled by a temporary trade policy aimed at incentivizing EV adoption. In 2015 the Brazilian Foreign Trade Council issued Resolution no. 97, which decreased import tariffs on hybrid and electric cars.³⁹ This open trade policy was accessible to all automakers, but it was Chinese producers searching for new, higher-margin markets abroad amid fierce domestic competition starting in 2023 that ended up being the primary beneficiaries. At one point in 2024, Brazil was the single largest importer of EVs from China, although this was also the result of companies front-loading their exports to avoid the scheduled reintroduction of tariffs in January 2024 and a further increase in July 2025 (see Figure 9).

Figure 9: EV Imports from China to Brazil, January 2020–August 2025



Source: "General Data," Comex Stat, Brazil Ministry of Development, Industry, Trade and Services, updated September 2025, <https://comexstat.mdic.gov.br/en/geral/134039>.

Brazil reintroduced tariffs on EVs and plans to continue increasing them gradually to reach 35 percent in 2026 (see Table 2). Fully or partially disassembled vehicles (complete and semi knockdown kits) are also subject to increasing tariffs that will reach 35 percent in 2027, after domestic firms lobbied to reduce the reduced-tariff timeframe.⁴⁰ Interviews conducted by CSIS researchers with experts and industry representatives indicate that the tariffs were the result of lobbying from domestic producers seeking to protect their market, rather than a planned government industrial strategy such as that pursued by Indonesia and Thailand. However, these

measures appear to have helped achieve a similar outcome since at least two Chinese OEMs now own EV factories in Brazil. It is possible that the companies might have made those investments regardless, but the tariffs may have facilitated that decision.

Table 2: Brazil’s Tariffs Phase-in for EVs

Date	BEVs	PHEVs	HEVs
Jan-2024	10%	12%	15%
Jul-2024	18%	20%	25%
Jul-2025	25%	28%	30%
Jul-2026	35%	35%	35%

Note: HEVs stands for hybrid electric vehicles, which in this report are not categorized as EVs.

Source: “O Programa Mover visa atração de investimentos. Como o Programa viabilizará novos investimentos no País?” [The Mover Program aims to attract investment. How will the program facilitate new investments in the country?], Brazil Ministry of Development, Industry, Trade and Services, May 24, 2024, <https://www.gov.br/mdic/pt-br/aceso-a-informacao/perguntas-frequentes-faq/secretaria-de-desenvolvimento-industrial-inovacao-comercio-e-servicos/o-programa-mover-visa-atracao>.

The most high-profile investment so far has been BYD’s facility in Camaçari, in eastern Brazil. The factory was built on the site of a former Ford plant purchased by BYD in 2023. While the symbolism of a Chinese brand revitalizing a closed legacy U.S. automaker’s plant is potent, there have been challenges along the way. The opening of the plant was delayed in late 2024 when Brazilian authorities denounced the “slavery-like” conditions that Chinese laborers hired to build the factory were working in.⁴¹ In July 2025, BYD announced that the first BYD Dolphin Mini had been produced at the Camaçari plant, although the factory will not be fully operational until 2026 and still relies on knockdown kits from China.⁴²

Another Chinese firm, GWM, acquired a former Mercedes-Benz factory in Iracemápolis in 2021 and inaugurated the factory at an August 2025 event attended by President Lula.⁴³ Chery has been producing ICE vehicles in Brazil since 2014 and has announced its aim to assemble EVs in Brazil as well, but its factory in Jacareí has reportedly encountered some issues and its prospects are unclear. GAC has announced its plans to start producing in the country by 2030, although this will likely depend on demand in Brazil. Geely announced in February 2025 that it will take a minority stake in a joint venture controlled by Renault to produce and sell EVs in Brazil, though further details have yet to emerge.⁴⁴

IMPLICATIONS AND FUTURE OUTLOOK

Brazil’s rapid surge in EV sales has been the result of a timely interaction between domestic policy shifts and the increasing internationalization of Chinese producers. While programs like MOVER have demonstrated the Brazilian government’s eagerness to promote domestic production of EVs—particularly through funding of R&D and investment—in many ways, the most consequential single policy choice was the temporary reduction in tariffs that encouraged the entrance of Chinese OEMs

into the Brazilian market. This proved that Brazil had a market and that conditions were particularly favorable to Chinese companies, especially BYD. Now that tariffs have been reintroduced, the market will enter a new phase: As Chinese OEMs start to produce domestically in Brazil, the test will be whether they are able to produce vehicles at similar price points to those they were previously importing, and to what degree they will continue to rely on imported components.

BYD's troubles with labor law suggest that Chinese companies will need a period of adjustment to adapt to local regulations, but the most important and challenging demand that the Brazilian government can impose is the further localization of supply chains, potentially including R&D. Perhaps the most important signpost will be whether significant production of batteries will start taking place in Brazil. BYD has committed to some degree to move in this direction—acquiring lithium mining rights as a way to create a supply chain for eventual production within Brazil—but should the company produce battery cells at scale in Brazil, that would be a significant new development that would suggest willingness to truly localize and mark a relative success for Brazil's own industrial policy.⁴⁵ Beyond batteries, Alexandre Baldy, chairman of BYD in Brazil, has expressed the company's commitment to further localization, saying, “We have the semi-knock-down kit as an initial stage—and, after that, we will advance to full production on national soil.”⁴⁶

The signpost for failure would be limited success in the production of vehicles and localization of supply chains and, at the same time, limited growth in the market. The inability to produce at scale while maintaining affordable prices, combined with limited efforts on the part of the government to expand charging infrastructure and policies conducive to stimulating demand, would likely contribute to such a failure. Ultimately, the government's limited commitment to EVs could also lead to a slowdown in sales, which could plateau, especially if Chinese firms are unable to bring new models or break into new market segments. This could have knock-on effects on the industry's ability to transition to producing EVs at scale and to drive innovation in the automotive sector as a whole.

Indonesia

Indonesia has sought to develop a domestic automotive industry since at least the 1970s, but the industry only took off after several waves of liberalization that encouraged more FDI, especially following the Asian financial crisis in 1997.⁴⁷ This reflected a shift from an intensive growth model to an extensive one, and as a result, the industry has been highly dependent on foreign companies, especially Japanese producers. Indonesia's automotive exports have increased over the past two decades, but it is largely dependent on imports for components, and much of the manufacturing consists of final assembly of knockdown kits.

Part of the challenge for Indonesia's automotive market is that despite the country having the fourth-largest population in the world, its automotive market remains relatively small. In 2024, a particularly underperforming year, only 866,000 cars were sold in the country, according to GAIKINDO, the leading automotive association in the country.⁴⁸ Much of the country still relies on two- and three-wheelers and buses for transportation; the car ownership rate is less than half that

of Thailand and almost a fifth of that of Malaysia.⁴⁹ Yet, if average incomes increase, then automotive demand could grow significantly in coming years, with large-scale implications for businesses, air pollution, and greenhouse gas emissions. Interviews conducted by the CSIS research team with local experts highlighted that Indonesian policymakers have been pursuing an EV-forward set of policies to tackle growing import dependency for oil as well as to support a broader industrial strategy to develop a local battery industry.⁵⁰ The country's large nickel mining and refining industry has contributed to the development of a holistic strategy to establish Indonesia as a player in the upstream as well as downstream value chain for EVs and batteries.⁵¹

EV POLICY IN INDONESIA: ATTRACTING INVESTMENT THROUGH TRADE

Two policies have been instrumental over the past two years in promoting EVs.⁵² First, starting in April 2023, the Indonesian government reduced the value-added tax (VAT) on EVs that met a 40 percent local content requirement from 11 to 1 percent.⁵³ The policy effectively acts to lower the upfront cost for consumers buying a locally made EV—a demand-side incentive—and mostly benefited Korean EV maker Hyundai and Chinese company Wuling (which U.S. automaker GM has a 44 percent stake in), both of which have plants operating in Indonesia and source components from the country. Prior to 2024, the two brands represented the majority of EVs sold in Indonesia, but although their sales went up after the removal of the VAT, they had a limited impact on overall EV sales. Sales of EVs accounted for less than 2 percent of all car sales in 2023, according to data from EV Volumes. One expert interviewed by CSIS researchers indicated that the high cost and limited choices available to consumers were significant obstacles.

Some additional demand-side incentives have been adopted at the regional level, with Jakarta's government exempting EVs from odd-even plate number usage restrictions, for example.⁵⁴ Moreover, since 2023, all BEVs are exempted from the annual car ownership tax and title transfer fees.⁵⁵ According to one interviewee, the car ownership tax exemption in Jakarta is a powerful incentive that lowers annual ownership costs for consumers and is being considered in other large Indonesian cities such as Surabaya and Medan.

The second major policy driving the rapid increase in EV sales over the past year has focused on the supply side. The Indonesian government temporarily removed duties on imported EVs (previously at 50 percent)—both completely built up (CBU) and completely knocked down (CKD) vehicles—for car companies committed to establishing a factory in Indonesia by 2026.⁵⁶ To ensure compliance, companies are required to put up the same amount of money that they would have otherwise paid in import duties and luxury taxes (15 percent), which are also waived, in the form of a bank guarantee.⁵⁷ The government can take over the funds if a company fails to follow through on its commitment. The policy is not novel; Thailand, which is now home to several EV assembly plants, introduced a similar scheme to jump-start its EV industry two years ago.⁵⁸

As a result of the policy, Indonesia is experiencing an increase in investment for EV assembly and production. Some companies, such as Chery and PT Sokonido (a subsidiary of Chinese firm Seres), updated their existing ICE vehicle local assembly capacity (in the case of Chery, through a local partner) to produce EVs in 2023.⁵⁹ MG, whose parent company is a controlling shareholder of Wuling, has been able to leverage the latter's factory to assemble complete knockdown kits in

Indonesia since 2024.⁶⁰ Several other companies are building new factories (Vinfast and BYD) or partnering with local assembly companies (GAC AION, Geely, Citroen, and Neta Auto, a subsidiary of Hozon).⁶¹ Even Toyota, which is a legacy leader in the country's ICE vehicle market, has announced its plans to start manufacturing a new EV model in Indonesia.⁶²

Most new factories would need to be completed by the end of 2025 to meet the requirements of the tariff exemption arrangements. At least in the case of BYD, the long-term objective is to use the factory for exports, although it is not clear if this means that Indonesian production would be competing with the company's Chinese production, which is already very large.⁶³ Regardless, in the short term, the Indonesian market will be the primary objective.

INDONESIA'S NICKEL AND BATTERY POLICY

Relevant to the development of a domestic EV industry is Indonesia's nickel industry. In 2023, Indonesia accounted for 42 percent of global nickel reserves and 51 percent of global nickel mine production, a share that is expected to increase to 74 percent by 2028 according to Macquarie, an Australian bank and asset manager.⁶⁴ The country introduced increasingly strict restrictions on the export of nickel ore over the past decade.⁶⁵ The goal of the policy was to attract more investment in value-added activities such as refining, which has been met with some success, largely thanks to the inflow of Chinese investors into sites in Sulawesi and Halmahera.⁶⁶ As a result, in 2024, Indonesia produced 61 percent of the world's refined nickel, compared to 6 percent in 2015.⁶⁷

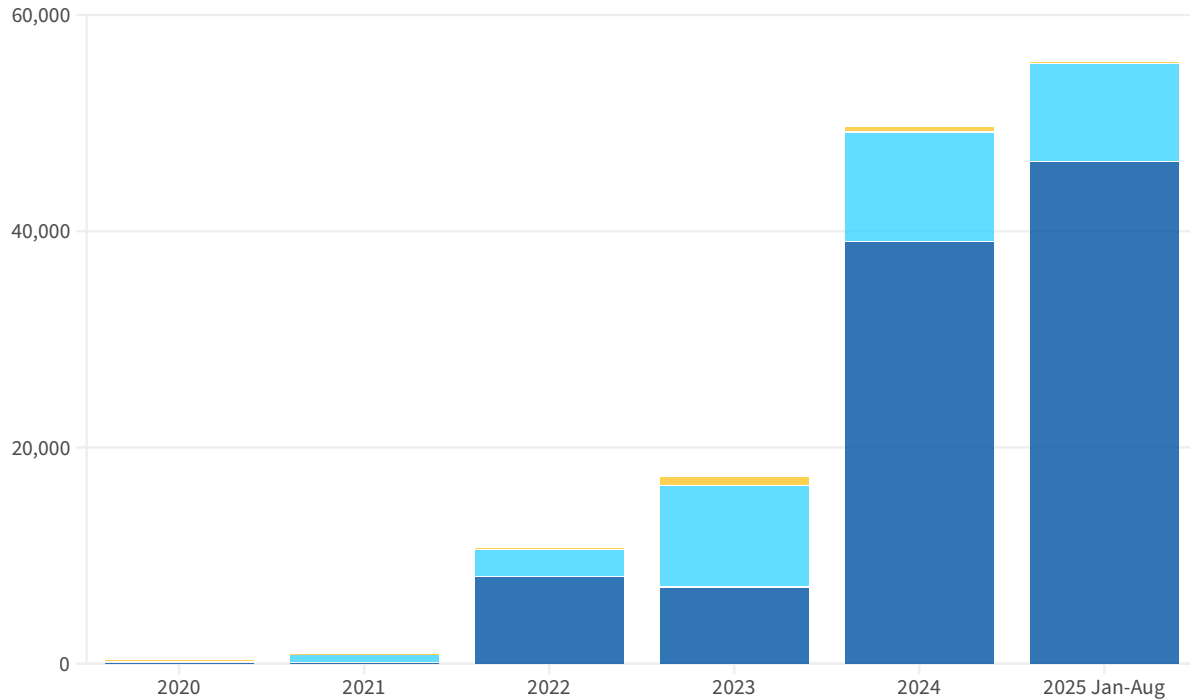
The Indonesian model is actively being studied by other resource-rich countries that have been trying to leverage their comparative advantage to secure more FDI. There have been some controversies due to the large environmental impact of the industry and the resulting increase of dependence on Chinese capital. Indeed, overreliance on Chinese companies also presents some challenges for Indonesia: Since most of the refined nickel is then sold to China, the localization of nickel refining has not increased the country's resilience. Moreover, these dependencies on China might potentially reduce Indonesia's attractiveness to other investors who see themselves as being at a perceived disadvantage.⁶⁸

The growing nickel refining industry is widely seen as an opportunity for Indonesia to gain more of a foothold in the battery value chain and establish more battery component and battery pack manufacturing. This strategy is important to understand given the recent developments in the domestic EV market, which may strengthen downstream demand for batteries. However, the popularity of LFP batteries, which are more affordable and do not contain nickel, present some new challenges to the country's strategy. According to data from EV Volumes, LFP batteries were used in about 70 percent of EVs sold in Southeast Asia in the first half of 2025. In Indonesia the share is even higher: Cars with LFP batteries made up over 80 percent of the cars sold in the first eight months of 2025 (see Figure 10). This means that the ore-to-car value chain development strategy envisioned for Indonesia may be more challenging to implement than envisioned, particularly if it is aimed at serving domestic or even regional demand.

Figure 10: EV Sales in Indonesia by Battery Cathode Chemistry

■ LFP ■ NMC ■ Other

Number of vehicles sold



Note: NMC stands for nickel-manganese-cobalt.

Source: EV Volumes.

In evaluating Indonesia's progress in developing a battery industry, it is worth noting that few countries have significant battery production capacity outside northeast Asia. China is particularly important for battery production as well as component production, including the refining of key minerals like lithium. The United States also looked poised to take a more significant position as a manufacturer until the partial repeal of the Inflation Reduction Act in mid-2025 lowered expected demand.⁶⁹

Although Indonesia's current manufacturing capacity may seem underwhelming relative to the country's own lofty targets, it is actually performing more strongly than several other emerging markets. Production of battery cells is one of the least diversified segments of the EV value chain and is likely to be an increasingly important area of focus, as the Chinese government recently moved to introduce export controls on technologies such as LFP battery chemistries. As noted in the Brazil case study, investment by Chinese firms to produce battery cells in other emerging markets should be monitored closely as evidence of significant localization and transfer of value-added operations.

Indonesia so far has one operational EV battery factory, the first in Southeast Asia, which has been operating since 2024. It is a joint venture between Hyundai Motor, LG Energy, and the Indonesia Battery Corporation that was established by the Indonesian government, with four leading state-owned enterprises as shareholders. This facility, whose production capacity of 10 gigawatt-hours (GWh) could power over 150,000 BEVs annually and currently produces nickel, cobalt, manganese, and aluminum (NCMA) batteries, has allowed Hyundai's EV production in Indonesia to boast an 80 percent domestic battery content.⁷⁰ In late April 2025, Indonesia's investment minister stated that LG remained committed to expanding the battery factory with an additional \$1.7 billion investment.⁷¹ As Chinese competition has increased, Hyundai's domestic sales have dropped from over 7,500 vehicles in 2023 to just around 2,800 in 2024, according to data from EV Volumes. However, this is not reflective of Hyundai's overall production, which has grown, making the company the fourth-largest producer in the country in 2025. About 67 percent of Hyundai's production in the first five months of 2025 were destined for export.⁷²

These developments suggest that Indonesian-made batteries containing nickel may become more popular as an export while LFP batteries made in China or by Chinese firms may power many of the vehicles sold in Indonesia. Overall, this trend highlights the continued importance of trade and complex global value chains, which still largely fail to overlap neatly with national borders.

Some new announcements suggest increasing Chinese involvement in the Indonesian battery sector. In August of 2024, a new factory focused on producing anode materials for EV batteries was inaugurated; the main investors were a Chinese company, BTR New Material Group, and a Singaporean firm, Stellar Investment.⁷³ In June 2025, a consortium that includes the Indonesia Battery Corporation; ANTAM, an Indonesian state-owned mining company; and CBL, a subsidiary of Chinese battery giant CATL, announced that it will be developing a large-scale production facility in Indonesia's West Java Province.⁷⁴ The plant will reportedly initially be able to produce 6.9 GWh annually and will include advanced recycling capabilities. In 2025, LG Energy announced it was pulling out of a project it had committed to in 2020 that involved investing throughout the battery value chain in Indonesia to create an integrated battery industry.⁷⁵ Reportedly, a Chinese company, Zhejiang Huayou Cobalt, has replaced LG Energy in the project.⁷⁶

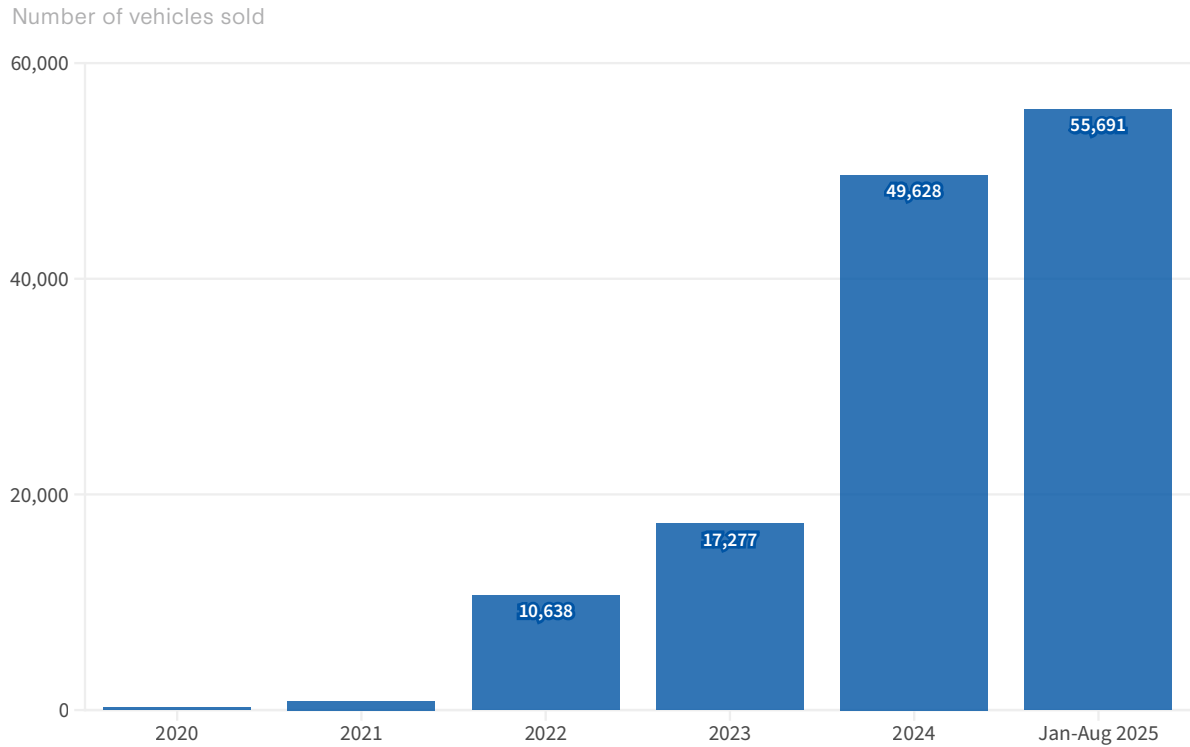
These reports highlight the high levels of uncertainty around demand and profitability in the sector and the possibility that Chinese companies, which are often able to make longer-term investments thanks to patient (often state-backed) capital, could replicate the same patterns present in the nickel industry. Although promising for Indonesia's ability to develop a battery industry, these investments may still encounter some challenges, as evidenced in other regions where Chinese companies are attempting to localize production, from Brazil to Europe.

INDONESIA'S PASSENGER EV MARKET: RAPIDLY GROWING AND INCREASINGLY CHINESE

Indonesia's Presidential Regulation (PR) No. 55/2019 and the National Grand Energy Strategy (GSEN) provide much of the policy framework for the promotion of EVs in the country, projecting 2 million electric passenger cars on the roads by 2030.⁷⁷ Current numbers are well below this target but have been increasing remarkably quickly, exceeding the expectations of many observers.

Indeed, Indonesia’s EV sales in the first eight months of the year have overtaken those of all of 2024, indicating sustained growth in an overall stagnating automotive market (see Figure 11).

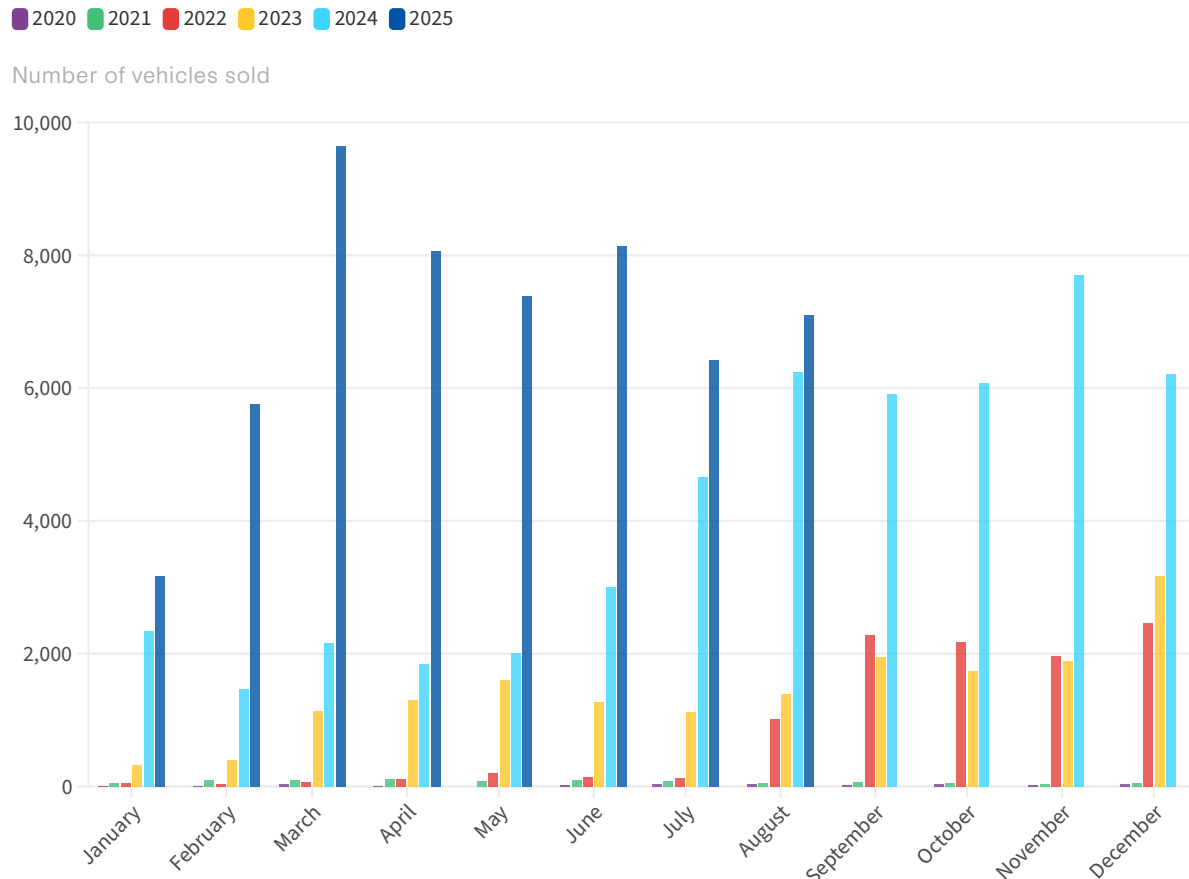
Figure 11: EV Sales in Indonesia, January 2020–August 2025



Source: EV Volumes.

EV sales in 2024 were remarkably high compared to previous years, with especially high sales numbers in the second half of the year (see Figure 12), consistent with the introduction of policies that facilitated more imports in the second quarter of the year.

Figure 12: EV Sales in Indonesia by Month

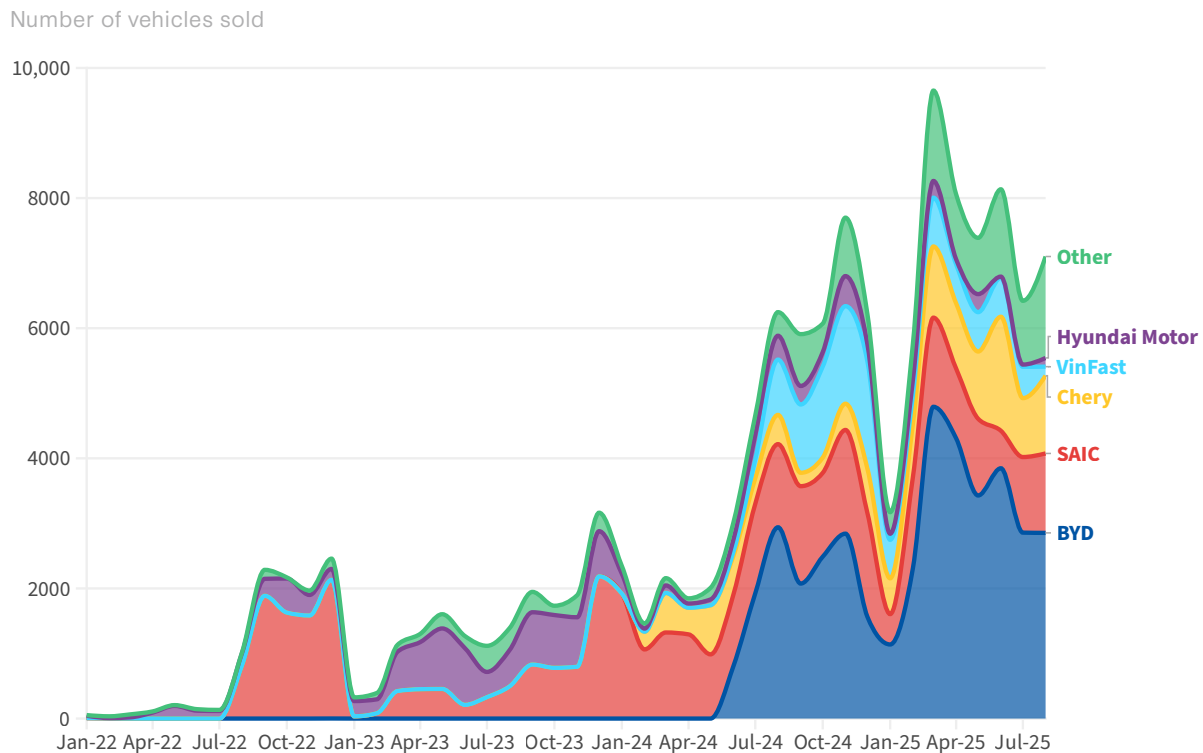


Source: EV Volumes.

The composition of new sales also demonstrates the role played by new entrants. While Wuling and Hyundai were the two main brands prior to 2024, the playing field has broadened widely since then (see Figure 13). Indeed, Wuling and Hyundai have experienced fewer sales since competition has increased despite being early beneficiaries of the VAT exemption program (as mentioned previously, their production volumes have not declined, and exports have risen). This highlights the complex political economy trade-offs involved in introducing policies that benefit different actors.

As a result, according to EV Volumes data, the EV sales rate in Indonesia for the first half of 2025 reached 12 percent, compared to 6 percent in 2024 and well under 2 percent in 2023. The change has been remarkable, though it has also presented a new challenge familiar to countries that have experienced a rapid expansion of their EV fleets: insufficient charging infrastructure. This is one of the major obstacles to furthering EV penetration identified by experts in interviews, and a common thread across all case studies in this report. Hyundai's decision to limit use of its chargers by other brands has exacerbated the issue at a time of rapid expansion in EV ownership.⁷⁸ But new investments may be forthcoming, with Vinfast and the state-owned electricity company PLN both announcing a large-scale effort to expand charging infrastructure.

Figure 13: EV Sales in Indonesia by OEM Group, January 2022–August 2025



Source: EV Volumes.

IMPLICATIONS AND FUTURE OUTLOOK

Chinese companies are set to benefit from Indonesia's EV growth, just as they have from the country's nickel processing boom. Indonesia-China relations have been positive in recent years, but tensions remain in specific areas, including trade, and some experts have voiced concerns over lack of diversification in supply chains and sources of investment.⁷⁹

However, these concerns do not seem to extend to the automotive sector, and the Indonesian government does not appear to want to actively reduce dependence on China for investment. Indonesian expectations are that increased Chinese investment in the EV and battery sector will bring more advanced manufacturing to the country. The projected levels of investment are promising, but it will be worth revisiting the outcomes in the future to evaluate whether expectations have been met. Indonesia's advantage compared to several other emerging markets is that it has been able to secure EV investments from non-Chinese companies as well, including Hyundai. This diversification, if cultivated, could provide the government with more leverage and resilience.

In conclusion, Indonesia is experiencing a rapid increase in EV sales in conjunction with growing investments in domestic assembly and manufacturing. The recent increase in sales is clearly linked to the tariff reduction that has allowed for new affordable vehicles to enter the market, largely

from China. As with other countries that are FDI recipients, there are unanswered questions as to whether a domestic industry will be able to provide similarly attractive and competitive models or whether the government will be able to ensure that investment leads to value-added manufacturing beyond final assembly. Either way, domestic demand for EVs and batteries will be important to cultivate to achieve the country's industrial goals.

Despite the government's goal of transforming Indonesia into a battery and EV export hub, in the short term, a growing domestic market will be its most important point of leverage for attracting investment. Indonesia could indeed become a battery and battery component exporter to other countries in the region, but it would still be competing directly with Chinese manufacturing. For auto exports, it would also compete with regional actors like Thailand and Vietnam, which are in the process of increasing EV exports. Ultimately, being able to develop a strong domestic market would provide a more stable outlook for the industry and bring significant climate and air pollution benefits as well. The government's current level of commitment to expanding EVs is promising, but how policy evolves in the coming years will be crucial to assessing the country's success in developing an industry and a market.

India

Throughout the country's history, India has balanced both intensive and extensive growth models for the auto industry, at times strengthening national players and at times seeking to attract foreign investment and encouraging joint ventures. Following independence, the Indian government pursued an import-substitution intensive growth model that persisted until 1983, when the Indian government formed a joint venture with Suzuki called Maruti Udyog. This was followed by the broader liberalization of the Indian economy in 1991 and the subsequent liberalization of the auto industry in 1993.⁸⁰ Other companies later followed suit: Honda and Toyota established joint ventures with Indian firms and Hyundai established a subsidiary in the 1990s.

However, unlike Indonesia and Brazil, India also has several successful domestic OEMs, including Tata Motors and Mahindra & Mahindra, which play an important role in its EV strategy.⁸¹ The country also became the fourth-largest automotive manufacturer globally in 2024.⁸² The automotive industry accounts for 6 percent of India's GDP, according to recent data issued by the Indian government.⁸³ In terms of market size, over 4.3 million passenger vehicles were sold in India in fiscal year 2025 (April 2024 to March 2025) according to the Society of Indian Automobile Manufacturers, making it the fourth-largest passenger vehicle market behind China, the United States, and Japan.⁸⁴ Despite its rankings, the market remains small relative to the country's population of over 1.4 billion. Indeed, the majority of Indians still rely on other forms of transportation, notably two- and three-wheelers. For comparison, over 19.6 million two-wheelers were sold in FY 2025 alone. The National Family Health Survey (NFHS) conducted in 2022 showed that only around 8 percent of Indian households own a car.⁸⁵ This indicates huge potential for growth, with large-scale implications for global emissions and pollution, as well as opportunities for industrial development.

EV POLICY IN INDIA: BOLSTERING DOMESTIC PLAYERS

India's policymakers have chosen to adopt several measures on the supply side and more limited demand side support for passenger vehicles. India's demand-side policy agenda has largely focused on electric two- and three-wheelers, though it also provides subsidies for various vehicle types (including ambulances) and charging infrastructure. The most notable policy on the demand side has been the FAME (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles) scheme, which had two phases that started in 2015 and 2019, respectively.⁸⁶ Both iterations of FAME focus on providing consumer incentives for the purchase of 2- and 3-wheeler vehicles. FAME II in particular aimed to support the purchase of 1.5 million and around 155,000 two- and three-wheelers, respectively. FAME II was also markedly larger in scope, with 100 billion Indian rupees (around \$1.2 billion) in funding compared to the 8.95 billion Indian rupees (around \$102 million) earmarked in the first phase.⁸⁷ FAME II officially came to an end in March 2024.

The most recent demand-side program is the E-Drive Scheme, which began in September 2024 and runs through March 2026.⁸⁸ Similar to FAME, the scheme focuses on supporting the purchase of two- and three-wheelers, though its primary focus is on vehicles registered for commercial purposes. The program has a budgetary outlay of 109 billion Indian rupees (around \$1.3 billion) and has a maximum target of around 2.8 million total vehicles supported. Given its shorter period, this makes the program more substantial than even FAME II.

Both iterations of FAME and the newly introduced E-Drive Scheme have consistently not provided subsidies for private four-wheelers, although both phases of FAME provided incentives for commercial four-wheeler vehicles, such as taxi fleets, which make up around 7 percent of the Indian four-wheeler vehicle market.⁸⁹ The E-Drive Scheme notably provides no subsidies for four-wheeler vehicles outside of buses, ambulances, and e-trucks. It is also notable that without subsidies, four-wheeler EVs tend to be around 1-1.6 times more expensive than comparable ICE models, even if the total cost of ownership is comparable due to savings on fuel.⁹⁰ The reticence to provide subsidies for private four-wheelers is the result of equity concerns, according to interviewees—essentially, the government is focusing on two- and three-wheelers, which are accessible to a wider segment of the population, to avoid subsidizing more affluent private consumers.

The most notable supply-side policy in India is a series of production-linked incentive (PLI) schemes for advanced batteries, automobiles, and auto components.⁹¹ The Advanced Chemistry Cell (ACC) Battery Storage PLI was approved in May 2021 with a budgetary outlay of 181 billion Indian rupees (around \$2.1 billion). The auto and auto component PLI was approved in September of the same year with a budgetary outlay of 259.38 billion Indian rupees (around \$2.9 billion) for a period of five years. Both PLI schemes have explicit requirements for localization and are aimed at strengthening domestic supply chains for battery and auto manufacturing.

Some Indian states have also been particularly active in pursuing state-level industrial policies. Tamil Nadu, for example, released its Electric Vehicles Policy in 2023, which most notably includes an “EV Special Manufacturing Package” that provides OEMs investing in the state a series of tax exemptions and incentives ranging from subsidies for land to subsidized loans.⁹² Karnataka

unveiled an EV policy in 2017 and recently released its Clean Mobility Policy 2025-2030, which offers a 25 percent subsidy on total invested capital expenditures.⁹³ In its recently updated Electric Vehicle Policy, Maharashtra provides additional demand-side incentives for EV purchases.⁹⁴ Other states, such as Uttar Pradesh, Gujarat, and Delhi, have introduced dedicated EV policies primarily on the demand side.⁹⁵ This is by no means an exhaustive accounting, but serves as a reminder that subnational governments play an important role in shaping India's EV manufacturing and sales landscape.

A key policy on the supply side in the coming years will be the next iteration of the Corporate Average Fuel Efficiency (CAFE) standards, which are currently being developed. The scheme, which rewards vehicles with higher fuel efficiency—such as EVs—could have a significant impact on how manufacturers prioritize their production and sales in the future.

India's policy agenda has provided it with mixed success. The FAME scheme has been successful in helping electrify two- and particularly three-wheelers, which do serve as the most important modes of transport for urban areas in India and feature some important domestic players. India's four-wheeler EV market, while growing quickly, still has comparatively low rates of electrification, especially when compared to other countries that have been more open to foreign exports and investment.

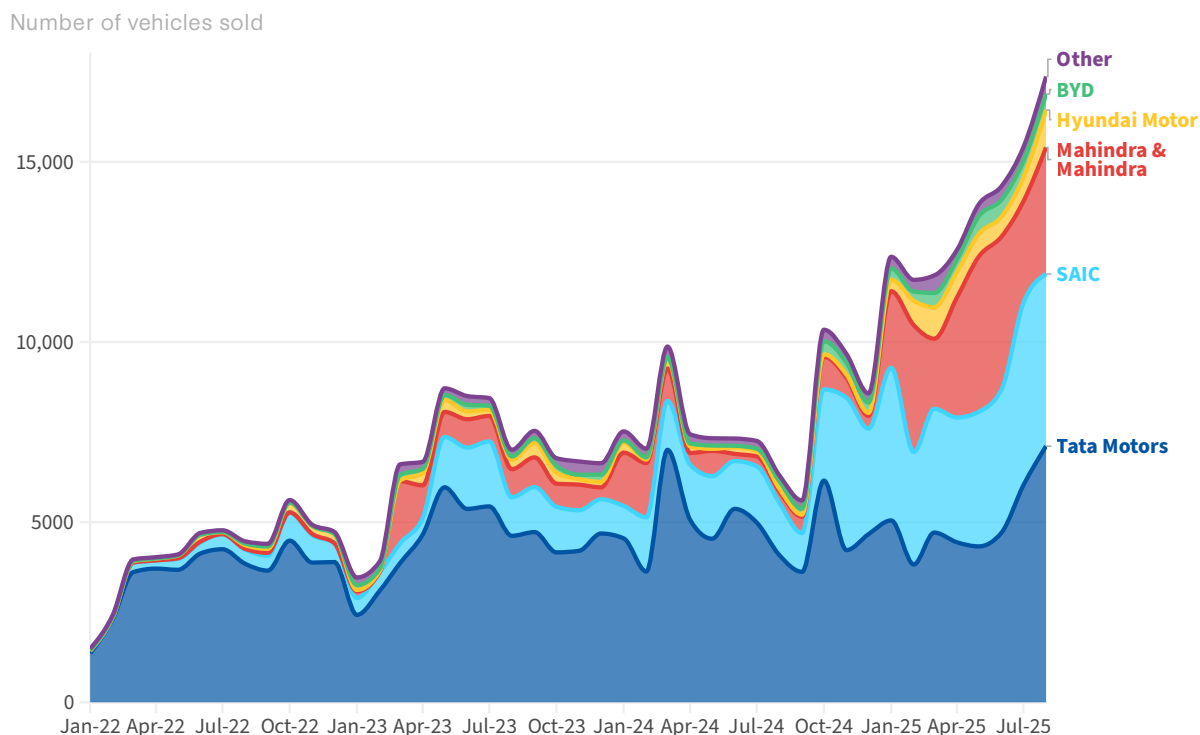
Compared to some of the other countries in this study, India stands out for having consistently maintained high levels of tariffs on EVs, which currently average around 100 percent.⁹⁶ The most recent notable policy is the move to introduce a tariff reduction for EV manufacturers that can commit to local manufacturing, similar to policies implemented in Indonesia and Thailand.⁹⁷ However, the scheme is specifically targeted at higher-cost vehicles whose cost at the port of entry is over \$35,000 and limits imports to 8,000 a year. As a consequence, it is unlikely that the policy will have the same transformative effect as it has in other countries. Moreover, continued political tensions between India and China suggest that Chinese OEMs will be less welcome than others when it comes to new investments in the country. At the time of writing, reports have indicated that India may also lower tariffs on EVs as part of its trade negotiations with the United States, but there is limited clarity on whether that would be limited to U.S. OEMs or would include products from other countries as well.⁹⁸

INDIA'S PASSENGER EV MARKET: LARGE BUT STILL CONSTRAINED

India's four-wheeler EV sales share has risen in recent years, but at a slower rate than in some other markets, going from around 0.4 percent of total sales in 2021 to 3.1 percent in the first half of 2025, according to data from EV Volumes. There are several reasons for this, including the sheer size of the market relative to other countries analyzed in this report. Nearly twice as many passenger EVs were sold in India compared to Indonesia in 2024, for example. And EV sales have been rising quickly in 2025, with sales in the first half of 2025 already at nearly 80 percent of total sales in 2024. However, a major difference with the other countries that experienced rapid increases in sales is India's high import tariffs on EVs, which prior to the latest policy shift could add up to 110 percent.⁹⁹

India's current EV market is largely dominated by two domestic manufacturers: Tata Motors, which held around 35 percent of the market in the first half of 2025, and Mahindra, which had around 25 percent market share in the same period (see Figure 14).

Figure 14: EV Sales in India by OEM Group, January 2022–August 2025



Source: EV Volumes.

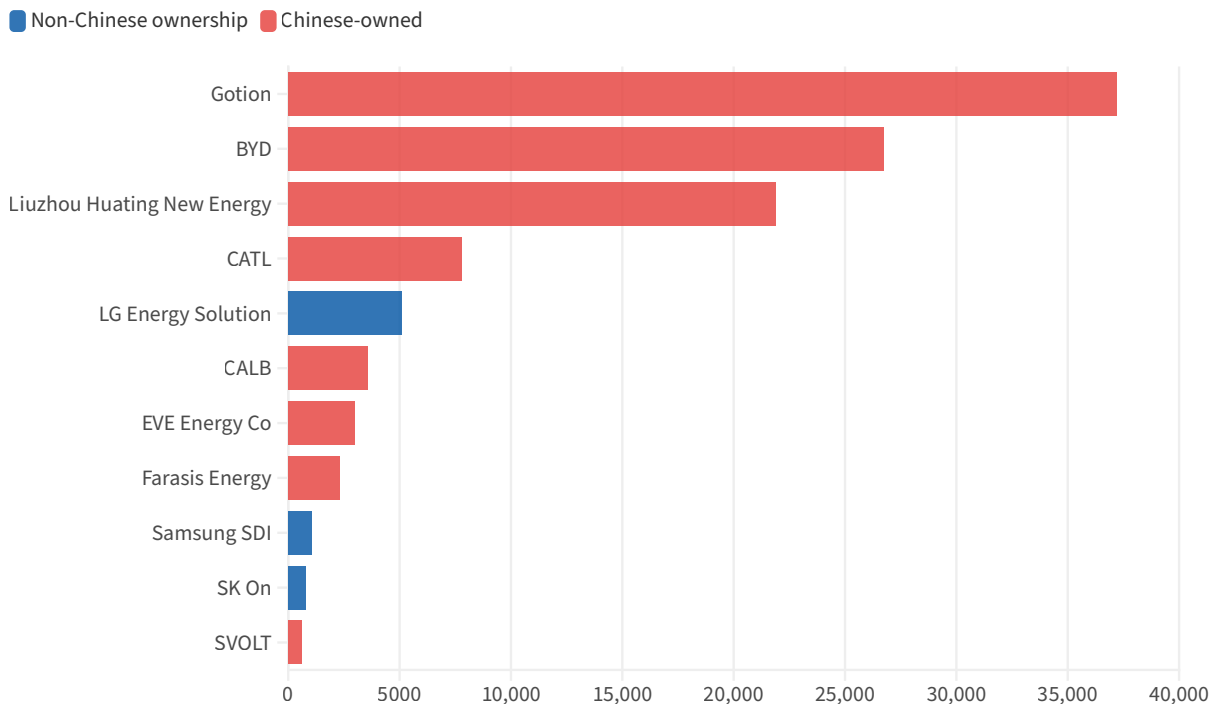
In addition to domestic companies like Tata and Mahindra, another important market player in the country is JSW MG Motor India, which represented nearly one-fourth of EV sales in India in 2024. The MG Windsor BEV, which is similar to the Baojun Yunduo EV sold in China and the Wuling Cloud EV in Indonesia, was the top-selling EV model in India in 2025. MG Motor, owned by Chinese company SAIC, has had an established presence in India since 2019, when it took over a former GM factory. In 2023, JSW MG Motor India was created as a joint venture between SAIC and JSW Group, an Indian conglomerate. However, recent reporting suggests that the venture may have gotten caught up in the geopolitical tensions between Beijing and New Delhi. JSW is reportedly increasing its ownership stake, which had already increased in 2024, while SAIC's will be diluted due to concerns over the bilateral relationship.¹⁰⁰ The move mirrors strategies adopted by other Chinese companies in India and, more broadly, reflects deep security concerns in India regarding economic dependency on China.

The case of BYD in particular, which has very limited sales in India, shows India's reticence to accept some forms of Chinese investment. In 2023 the Indian government reportedly blocked a \$1 billion proposal from BYD to set up a factory in Hyderabad with the local company Megha

Engineering Infrastructures.¹⁰¹ While BYD has an existing partnership with Indian firm Olectra to manufacture buses, so far it has been unable to establish a manufacturing presence for passenger vehicles, outside of limited assembly in Tamil Nadu.

BYD's case also proves the broader challenge in creating non-China value chains. While the company is a minor player in final vehicle sales, it serves as the primary battery provider for Mahindra models like the XEV 9e and BE 6e, which account for most of the company's EV sales growth in 2025. Similarly, Tata models largely rely on batteries from the Chinese firm Gotion. Indeed, the vast majority of EVs sold in India use batteries supplied by Chinese firms (see Figure 15). A recent move to reduce tariffs on imported batteries recognizes the importance of these components for the country's industry and electric grid.¹⁰²

Figure 15: EV Sales in India by Cell Supplier, January–August 2025



Source: EV Volumes.

IMPLICATIONS AND OUTLOOK: INDIA'S GEOPOLITICAL EV CHALLENGE

India's strategy reflects the inherent trade-offs in attempting to create domestic champions while insulating them from foreign competition—China in particular. The government's policy choices have not completely extricated the EV market from Chinese value chains, evidenced by continued reliance on Chinese battery suppliers and the popularity of SAIC-owned MG India. For batteries, the challenges will be especially large given that India's surge in renewables requires more stationary storage capacity.

India's passenger vehicle market remains largely in the hands of domestic players and is still growing, even if growth rates are lower than some other developing markets that have relied on rapid increases in imports. In the long term, this could make India's transition to EVs more politically sustainable and may even open the pathway to exports. However, given India's extraordinarily high dependence on foreign oil imports, which account for a third of its total imports, slower electrification could also have significant economic downsides. It is also worth noting that EVs could help mitigate India's extraordinary air quality challenge: Of the top 20 most polluted cities in the world in 2024, 13 were in India.¹⁰³ In short, there could be economic downsides to a slower adoption of EVs, especially if Indian OEMs fail to develop desirable and affordable new models.

Of all the case study countries covered in this report, India has by far the most fraught relationship with China and therefore some of the most concerns when it comes to deepening reliance on Chinese value chains and China-based firms. The two countries continue to have unresolved territorial disputes that at times have escalated into war or prolonged clashes, including the most recent border clashes in 2020. While both sides reached a border patrol agreement during the 2024 BRICS summit in Russia, such disputes remain fundamentally unresolved.¹⁰⁴

There have also been tensions over India's growing role as an alternative manufacturing base to China.¹⁰⁵ While a recent thaw in the relationship appears to be underway, with China lifting export restrictions to India on products such as rare earths, fertilizers, and tunnel-boring machines, the long-term direction of the relationship remains uncertain.

This complex and often tense relationship with China, combined with a preexisting approach to economic development that emphasizes joint ventures and localization, has led the country to take a skeptical view of Chinese investment. Chinese software and connective technologies, which are embedded in many new vehicles, are also likely to be viewed with suspicion. As a result, unless more creative arrangements are found through licensing deals or whatever ownership form JSW GM Motor India will take, India's electrification of transportation is still likely to be largely led by domestic players at a pace slower than China's.

Mexico

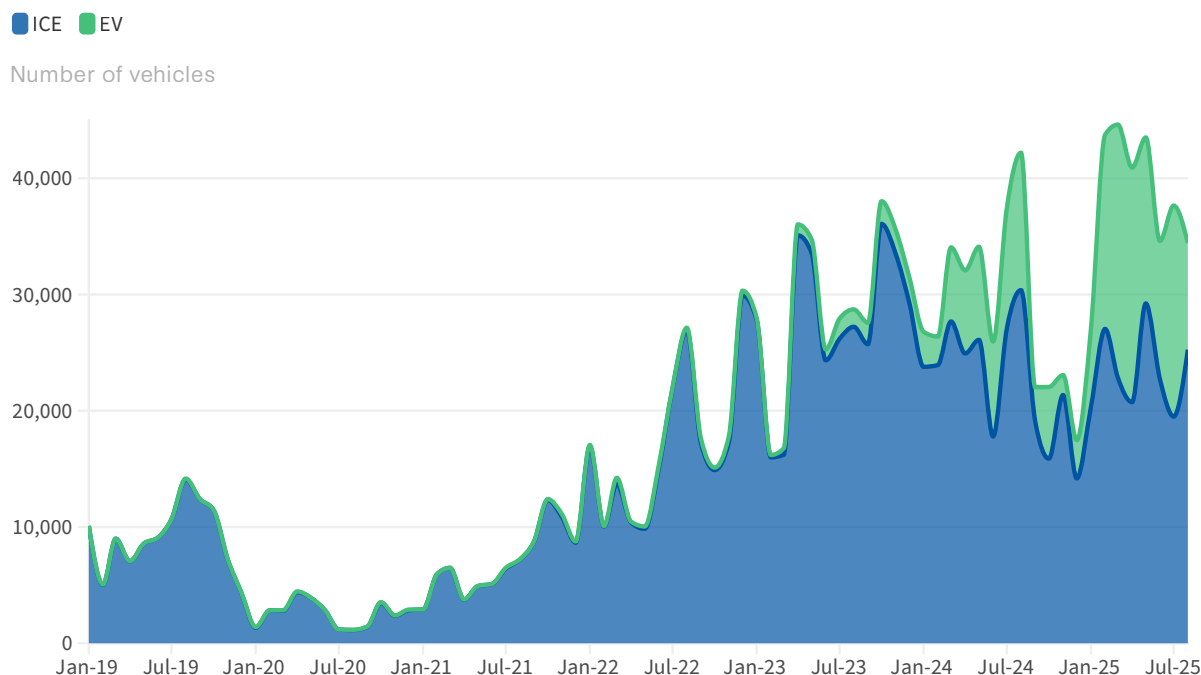
Mexico's automotive sector is uniquely integrated with the United States and Canada. Indeed, despite attempts to develop a domestic industry through strict local content requirements beginning in the 1960s, the country only became a significant manufacturer of vehicles after the establishment of the North American Free Trade Agreement (NAFTA) in 1994.¹⁰⁶ Since then, Mexico's importance as an automotive manufacturer has continued to grow. The country's automotive production increased 64 percent between 2000 and 2020, and some estimates even rank it as the fifth-largest automotive producer, before Germany.¹⁰⁷

The country's automotive industry accounted for between 3.6 percent and 4.7 percent of the nation's GDP in 2022 and 2023, according to varying estimates, and employed about 1 million people directly and 3.5 million people indirectly.¹⁰⁸ It has also benefited from the United

States-Mexico-Canada Agreement (USMCA), which entered into force in 2020. The USMCA, like NAFTA before it, continues to provide incentives for locating some production in Mexico to access the U.S. market. As a result, Mexico's industry is extremely dependent on the U.S. market: According to the U.S. Commerce Department in 2022, 88 percent of all vehicles made in Mexico were destined for exports, and of those, 76 percent went to the United States.¹⁰⁹

Despite its significant automotive manufacturing base, Mexico has become a major importer of vehicles made in China. In 2024, as much as 20 percent of cars sold in Mexico were Chinese imports, according to some estimates—a 50 percent increase since 2022.¹¹⁰ Most of those imported cars are made by Western brands whose ICE vehicle sales in China are falling and who are leveraging their factories there for exports globally. For example, 65 percent of GM's sales in Mexico in the first half of 2025 were of vehicles made in China.¹¹¹ The surge in ICE vehicle exports is reflected in the data, which shows this trend globally as well as toward Mexico specifically since 2020 (see Figure 16).

Figure 16: Vehicle Exports from China to Mexico, January 2019–August 2025



Source: General Administration of Customs of the People's Republic of China.

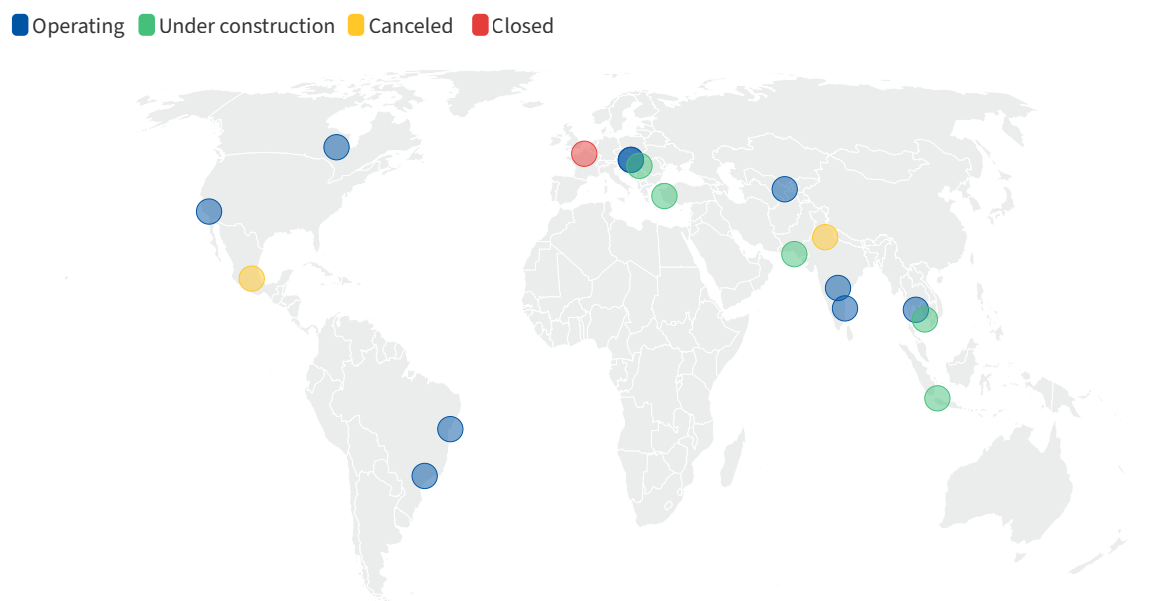
EV POLICY IN MEXICO: BETTING ON AMERICA

Mexico has attracted several EV-related manufacturing investments over the past few years, and its production of EVs has increased beyond that of most emerging markets: In 2024, over 200,000 EVs were made in the country, double the amount of the previous year.¹¹² However, although the government, and some local governments in particular, has been proactive in attracting investment, companies have been mostly responding to policies and market dynamics in the United States

rather than in Mexico. In fact, the single most important bill that drove the increase in EV value chains in Mexico was passed not in Mexico City, but in Washington, D.C. The Inflation Reduction Act (IRA), which became law in 2022, included provisions to accelerate the electrification of on-road transportation in the United States, as well as incentivize the sales of EVs that were made in North America and contained batteries with components from countries with which the United States had free trade agreements. As a result, manufacturers turned to Mexico, where many already had production bases and suppliers. It is telling that according to the IEA, U.S.-headquartered manufacturers accounted for about 70 percent of Mexico's EV production, the remaining 30 percent being European and Japanese OEMs.¹¹³ Indeed, analysis based on Kelly Blue Book data, from Electro Movilidad Asociación México, a trade association for the EV industry, indicates that most EVs imported in the United States come from Mexico.¹¹⁴

JAC is the only Chinese manufacturer that has, through a joint venture with a domestic firm, an assembly plant in Mexico, and it accounted for only 0.59 percent of EVs made in Mexico in the first 8 months of 2025, according to EV Volumes data. The company has been assembling vehicles in Mexico since 2017 and has more recently added EV production and expanded its assembly line, and all the products seem to be exclusively intended for the Mexican market.¹¹⁵ Despite several news reports of a BYD factory in Mexico, no such investment has been announced as of mid-2025, and recent announcements by BYD indicate that the plan has been shelved due to geopolitical tensions and uncertainty in U.S. trade policy.¹¹⁶ Moreover, BYD's global expansion (see Figure 17) has been so rapid that its ability to continue to deliver on all its commitments for new factories should be monitored closely.

Figure 17: BYD EV Factory Projects Abroad



Note: This map does not include electronic equipment and car component manufacturing plants owned by BYD unless they also explicitly produce vehicles.

Source: Authors' estimate based on company filings, government documents, and media reports.

Although unique access to the U.S. market has been an enormous boon for Mexico's industry, recent events have also served as a cautionary tale. The Trump administration and the current U.S. Congress have largely repealed the incentives aimed at increasing demand for EVs in the United States, which in turn has removed the main incentive for diversifying value chains outside of China and increasing manufacturing capacity for EVs in North America. This means that now many investments by OEMs are at risk since they are aimed at serving U.S. consumers. There may be resilience, however, in the broader ecosystem of investments in the supply chain, including components manufacturing and the broader upgrading to increase efficiency, which will have spillover effects on Mexico's ecosystem. Moreover, if demand for EVs were to increase throughout Central and South America, Mexico would be well placed to export to those regions.

There are some inherent risks associated with being overly dependent on a single market, although it may be unavoidable given the size of the United States and the level of economic integration between the countries. During the course of the spring of 2025, the Trump administration imposed a 25 percent tariff on non-USMCA-compliant Mexican goods and Section 232 tariffs on autos and automotive parts that do not qualify under USMCA.¹¹⁷ While President Claudia Sheinbaum's government has managed to navigate the ongoing trade war and has avoided most tariffs on USMCA-compliant goods, the relatively unpredictable nature of the Trump administration's trade policy has made it more challenging for firms to organize their supply chains.

Although the USMCA provides some predictability, the agreement itself will come under review in 2026, and consultations have already begun between Washington, Mexico City, and Ottawa.¹¹⁸ The automotive sector and Chinese investment are expected to be important topics of debate between the negotiators, with the United States likely to push for more restrictions on Chinese investors in Mexico and higher regional content thresholds. As of now there is still little clarity on how the renegotiated USMCA will affect EV value chains.

One final piece of the discussion centers around efforts to develop a Mexican EV brand to serve the Mexican market. The new Mexican government, led by President Sheinbaum, has championed an initiative to develop small, affordable EVs, branded Olinia, that mostly rely on Mexican value chains.¹¹⁹ The effort is spearheaded by the Science, Humanities, Technology and Innovation Ministry and the vehicles are scheduled for launch in 2026. If the initiative succeeds, it could provide an alternative to imports for the Mexican market. However, it is worth noting that Sheinbaum herself has highlighted that the smaller design of the Olinia is meant to provide an alternative to motorcycles, which are seen as more dangerous and are one of the fastest-growing mobility subsectors in the country.¹²⁰ Indeed, similar small EVs for urban travel have been launched in Bolivia and Argentina and serve a specific need in the market that may not entirely overlap with those met by imports.¹²¹

The government's desire to have the value chain for Olinia, including lithium, be largely sourced in Mexico appears particularly complicated to achieve given the very limited investments in Mexico's lithium industry, which the state-owned company LitoMx holds exclusive rights over. Should Mexico establish a lithium extraction and refining industry, it would certainly play an

important role in global value chains and help diversify further value chains, but this is unlikely in the medium term.

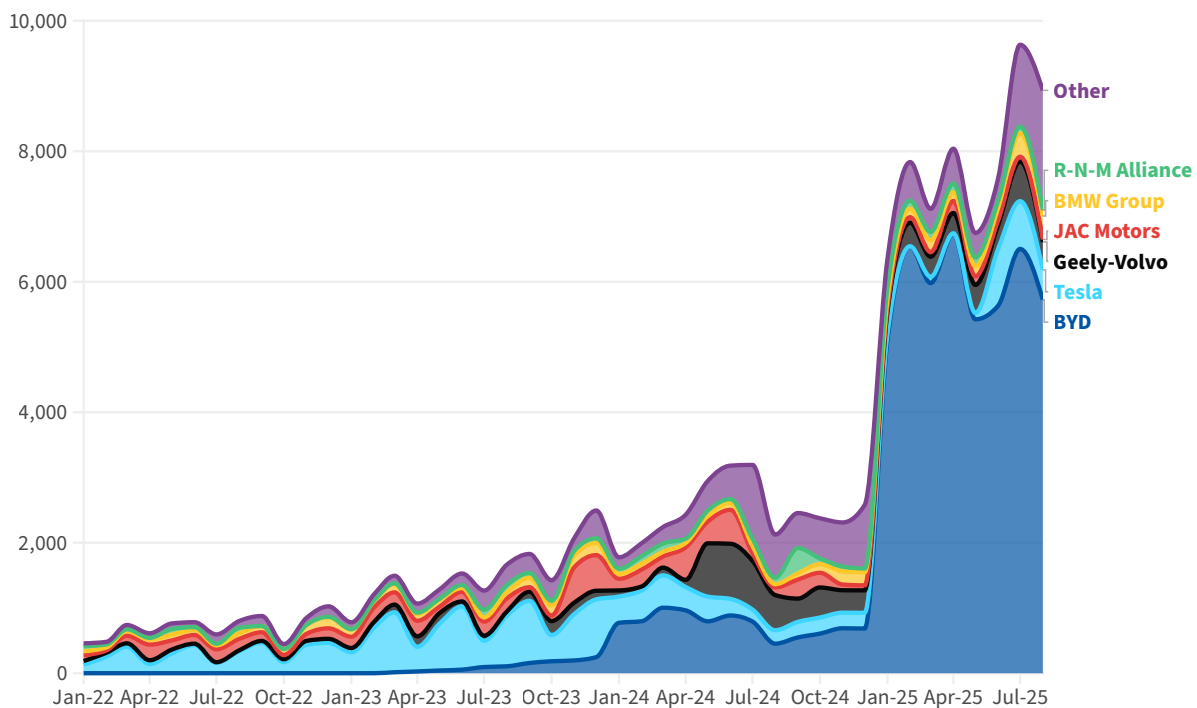
MEXICO'S PASSENGER EV MARKET: FINDING DEMAND

The dynamics at play in Mexico's EV sector closely mirror those of the ICE vehicle industry. Domestic production predominantly serves the export market, while domestic consumers often opt for cheaper imported products made in China. The average value of an EV exported to the United States from Mexico, for example, was around \$48,000 in 2024, according to the U.S. International Trade Commission; in comparison, the average value of an EV exported to Mexico from China the same year was only around \$18,000, according to China's General Administration of Customs.¹²² Although this is a crude comparison and does not reflect final prices to consumers, it provides an indication of a significant price gap.

Since EVs made for the U.S. market are relatively expensive, the increase in domestic investment has not translated smoothly to more domestic adoption. According to research by Electro Movilidad Asociación México, Mexican-made EVs actually cost on average 30 percent more in Mexico than in the United States.¹²³ Given limited efforts from legacy companies to develop the EV market, it is not surprising that the Mexican EV market has been relatively small outside of a recent surge in early 2025, which appears to be entirely driven by imports from China, specifically of BYD vehicles (see Figure 18).

Figure 18: EV Sales in Mexico by OEM Group, January 2022–August 2025

Number of vehicles sold



Source: EV Volumes.

In some ways, Mexico's reliance on the U.S. market has made its trajectory for passenger EVs look rather different from those of other countries. In Brazil and Indonesia, access to the domestic market has been used as a tool to attract more investment. In Mexico, investment has largely been disconnected from expectations regarding the domestic market or trade policy. In 2020, the Mexican government removed a 20 percent tariff on automotive imports from countries with which it did not have an existing free trade agreement, which included China.¹²⁴ This likely enabled more sales of electric buses in the country, but for passenger EVs the effect was less significant.

The 20 percent tariff was reintroduced in 2024 as imports from China increased and concerns emerged in Washington that Mexico might serve as a transshipment base for Chinese EV exports to the United States. This followed the Biden administration's introduction of 100 percent tariffs on EVs from China in May 2024.¹²⁵ However, unlike with other countries, EV exports from China to Mexico actually increased most significantly after the latter introduced higher tariffs, highlighting the growing incentives for Chinese OEMs to find new markets. Indeed, until 2023, most EVs sold in Mexico were American-made Teslas. The increase in Mexico's EV imports from China correlates with the broader increase in global EV exports by BYD and other Chinese brands, which is at least in part due to the surging supply in China and continued competition domestically.

As in other markets, the main driver of sales has been affordability. According to the IEA, the average price premium of battery electric cars in Mexico halved between 2023 and 2024 as Chinese imports increased as a share of sales.¹²⁶ Although BYD has quickly overtaken other exporters from China, non-Chinese brands have also been exporting successfully from China. For example, the cheapest EV model on the Mexican market is Renault's Kwid E-Tech Electric, which is made in China by the French automaker. Chevrolet's Spark EUV, which launched in June 2025 and retails for around \$23,000, is also made in China and expected to perform strongly in the Mexican market.

GEOPOLITICAL CHALLENGES AND OPPORTUNITIES FOR MEXICO

The message from Washington to the world these days is a warning against accepting too much Chinese investment. In most countries, the U.S. ability to enforce this restriction, and the metric by which Chinese investment is measured, is not clear. However, for Mexico, U.S. leverage is strong, and the stakes are very high. Mexico's proximity to the United States continues to provide significant economic opportunities for the country, but it also requires the government to take its northern neighbor's national security priorities very seriously. As a result, Chinese investment will be monitored and controlled closely by Mexican authorities to avoid becoming a liability in their relations with the United States. Trade too, although it is currently growing, may come under increased scrutiny in the future.

The structure of the industry itself, which is so heavily reliant on exports, offers limited resilience to shocks resulting from rapid policy changes abroad. Increasing the domestic market share might provide more stability in theory, but Mexican consumers are unlikely to be perfect substitutes for U.S. consumers given the disparity in incomes and the relatively high average price of vehicles made for export. The size of the market itself, although large by emerging market standards, is also hardly comparable, reaching almost 1.5 million light vehicle sales in 2024, less than one-tenth the size of the U.S. market that same year.¹²⁷

Although there is no substitute for the U.S. market, there are still inherent benefits in increasing the diversification of the Mexican automotive EV industry. Policies aiming to increase domestic sales and exports to other regions would help in this effort. Among other types of regulation to stimulate the domestic market, improving charging infrastructure could help; Mexico is currently ranked unfavorably by the IEA for its ratio of public chargers to EVs.¹²⁸ But more broadly, more investments to improve efficiency, expand economies of scale, and lower the cost of production in Mexico could help woo consumers in the United States as well.

To further link domestic production with domestic consumption, Mexico's industry should also attract investors capable of producing more affordable and smaller vehicles that might be more attractive to consumers in Mexico and outside the United States. Another move that would help stabilize Mexico's production is limiting imports of Chinese-made ICE vehicles, which serve no climate purpose and undermine domestic production. Higher tariffs on this segment could demonstrate to Washington a willingness to counter Chinese overcapacity while also helping Mexico reach its climate and industrial goals.

South Africa

Although South Africa does not rank among the top 20 global automotive manufacturers, the automotive sector plays an important role in the country's economy. The automotive sector accounted for 5.2 percent of South Africa's GDP in 2024, and of that, 3.2 percent came from manufacturing.¹²⁹ The automotive and automotive component industry is also particularly important for South Africa's exports, representing over 14 percent of exports in 2024.¹³⁰

In a situation that is not entirely unlike Mexico's but on a much smaller scale, South Africa is highly dependent on FDI and on exports to a single large market: the European Union. Almost 69 percent of light vehicles made in South Africa are exported, and of those, 75 percent are destined for the European Union.¹³¹ This creates a particularly delicate situation for South Africa given that starting in 2035, all new cars sold in the European Union must be zero-emission vehicles.¹³² In other words, the country must transition its production to meet the demands of its largest market over the next 10 years. Finding alternatives to the European Union, whose demand for relatively premium ICE car models is still higher than most other markets, will likely be challenging at a time when tariffs are increasing and producers everywhere are facing increasing competition with Chinese manufacturing. This may complicate the South African government's goal to reach 1 percent of global vehicle production by 2035, estimated at 1.4 million vehicles.¹³³

South Africa's domestic market is not particularly large: In 2024, the country saw about half a million new vehicle sales, of which just over 350,000 were passenger vehicles. South Africa's population of 64 million, comparable to that of France, might hold promise of higher demand in the future, but demand has been relatively slow in recent years.¹³⁴

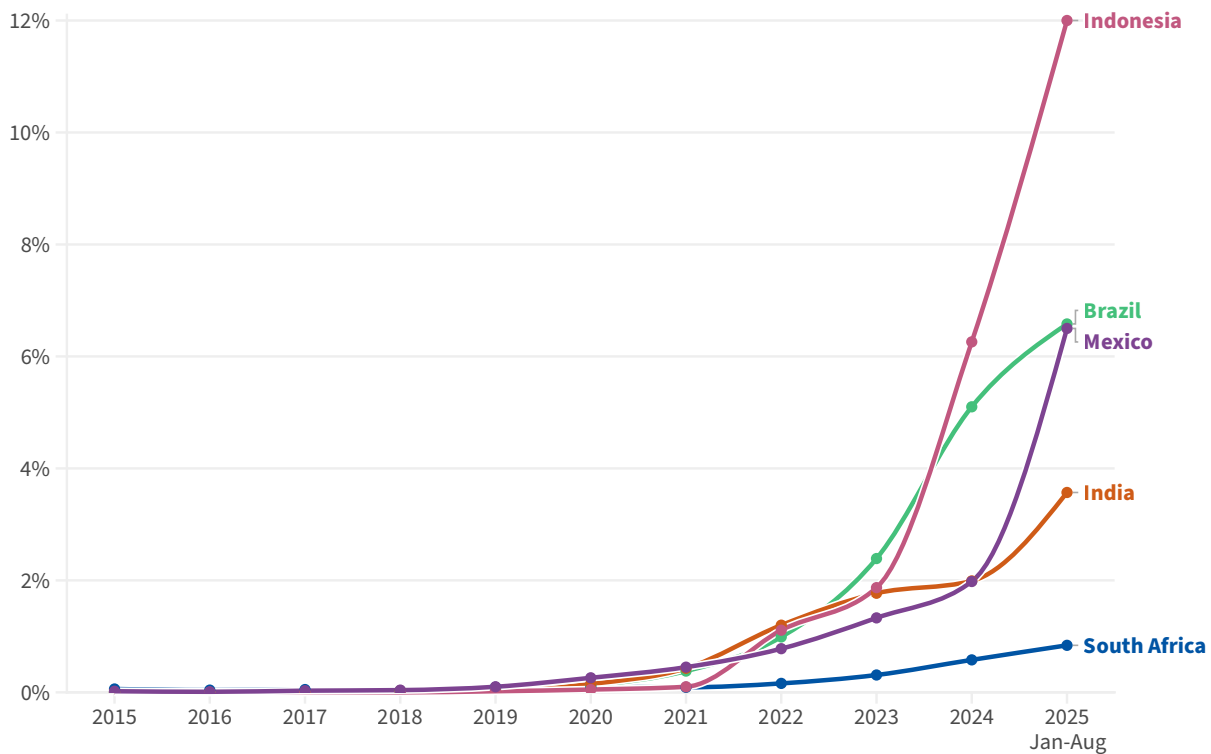
The country's automotive sector is highly dependent on FDI, and Ford, Nissan, BMW, Toyota, Mercedes-Benz, Stellantis, Mahindra, and Isuzu all have factories in South Africa. Chinese firms are also present, but their footprint is very small: BAIC announced in 2016 that it would open a plant in

the Coega Special Economic Zone, near Gqeberha (Port Elizabeth), as part of a joint venture with the South African Industrial Development Corporation.¹³⁵ However, by 2024 local reports indicated that only 300 cars had come off the assembly line, suggesting a mixed record for the initiative so far.¹³⁶ FAW has had an operational truck and commercial vehicle plant in Coega since 2014, and the plant celebrated its 10,000th unit produced in 2022.¹³⁷ The FAW factory appears to have benefited from Chinese government support through the China-Africa Development fund.¹³⁸ Both the FAW and BAIC investments appear to be relatively small compared to other manufacturing facilities in South Africa.

EV POLICY IN SOUTH AFRICA: SLOW START

Unlike most other countries analyzed in this report, South Africa is largely not on the map when it comes to the EV sector. EV sales have been insignificant as a share of overall automotive sales or in terms of volume (see Figure 19), and the country is not producing EVs or components in any significant way. It is also not a particularly significant player in the value chain, despite having some critical mineral reserves.

Figure 19: EV Sales as Share of Total Car Sales in South Africa and Select Emerging Markets



Source: EV Volumes.

The government acknowledged this challenge in 2018, in its Automotive Industry Master Plan to 2035, and published an Electric Vehicles White Paper outlining a vision for electrification in late 2023.¹³⁹ Yet, policymakers and businesses have not made significant progress toward these goals. Interviews conducted by the CSIS team suggested that concerns over job losses that may arise from

the transition explain the government's slowness in taking action. Most recently, however, the South African government announced a new policy package to encourage manufacturing investment in EVs through a 150 percent reduction in investment taxes starting in 2026.¹⁴⁰ There is speculation that the move is meant to attract Chinese automakers, which the government has reportedly been negotiating with, most publicly BYD.¹⁴¹ If these investments were to materialize, they would result in the first EV plants in Africa (not including the battery component production being built in Morocco).

SOUTH AFRICA'S PASSENGER EV MARKET: A CHALLENGING OUTLOOK

South Africa finds itself in a difficult position relative to the other countries in the sample because it has no proven domestic demand for EVs that can attract investors, nor is it a huge exporter like Mexico. There are several reasons why sales of EVs have remained so low. Some are structural, including low confidence in the reliability of the electric grid, which some interviewees identified as a challenge. Although grid reliability improved somewhat in 2024, consumers are likely still hesitant to trust that they will be able to charge their car easily or find public charging stations.¹⁴²

However, the main obstacle for EV adoption, identified in interviews and evident in the data, is that consumers do not have a wide array of affordable EV options. According to EV Volumes, in the first half of 2025, the best-selling EV model in South Africa was the BMW X3 plug-in hybrid, which has a manufacturer-recommended starting retail price of R1.26 million, or over \$70,000.¹⁴³ Like many other emerging markets, South Africa has not been a natural choice for legacy automakers to target or introduce low-margin affordable EVs. At the same time, the country has not introduced any preferential measures to facilitate the import of EVs, which means that it has not benefited as much from the international push of Chinese automakers.

South Africa imposes a baseline 25 percent tariff on all automobile imports, as well as a 20 percent tariff on auto components.¹⁴⁴ The Trade, Development, and Cooperation Agreement signed in 1999 negotiated a lower rate of 18 percent for ICE vehicles and PHEVs imported from the European Union and the United Kingdom but not, critically, pure electric vehicles, which still face a 25 percent tariff.¹⁴⁵ The issue has been identified as a challenge and may change in the future, but as it stands, it is signaling to producers in Europe that the government prioritizes ICE and PHEVs over entirely battery electric vehicles. Additionally, imported vehicles also face an ad valorem tax that can reach up to 30 percent depending on the vehicle's value.¹⁴⁶ Since EVs tend to be more expensive than their ICE counterparts, they are more likely to face a higher tax burden, which crucially expands the price premium between EV and ICE vehicles. A movement toward price parity has been the single most important factor in greater adoption in other markets highlighted in this report and in research from the IEA.¹⁴⁷

However, dynamics may change. The market has been growing rapidly and has almost doubled in size every year for the past two years. Trends for the first half of 2025 suggest that growth in sales may even surpass that rate this year. New Chinese OEMs known for their popular and affordable options, such as BYD, have just entered the market and could disrupt it significantly. Volumes, however, remain woefully small, with just over 1,400 new EVs sold in the first half of 2025, a tiny fraction of the overall market, according to data from EV Volumes.

IMPLICATIONS OF CHINA'S ROLE AND FUTURE OUTLOOK

South Africa-China relations have a long history, with roots in China's Maoist period. In recent years, economic issues have been at the heart of the two countries' relations. China has been South Africa's largest trading partner since 2008, and South Africa is China's main African partner.¹⁴⁸ The relationship continues to grow, with China being identified as an important strategic partner for Pretoria in 2024.¹⁴⁹ South Africa's main exports to China are minerals, and although it is currently not as critical an exporter of materials needed for battery production, such as lithium, it could become a larger player in the future.

The trading partnership is skewed in one direction, as China runs consistent trade surpluses with South Africa. This is an area of potential tension, especially in sectors where South African firms are in direct competition with imports. Given the importance of the automotive sector, the issue may take on new importance as Chinese exports grow. Cars are already the third-largest export from China to South Africa today.¹⁵⁰ In short, there seems to be no political obstacle to Chinese companies expanding their manufacturing presence in the country; the larger challenge for South Africa will be to demonstrate whether market demand exists, given that so far, no significant push has been made to encourage EV sales.

A recent announcement by Toyota that it will be launching three more fully electric EV models in 2026 could indicate that non-Chinese OEMs may also increase their offerings in South Africa.¹⁵¹ Importantly, India is an increasingly large exporter of passenger vehicles to South Africa, consistently surpassing China. However, these are predominantly ICE vehicles, and Tata Motors' EV exports have not increased significantly in recent years. As Indian EV manufacturers expand, there may be an opportunity to broaden options for South African consumers and reduce the likelihood of the market becoming entirely dominated by Chinese players.

In conclusion, South Africa is facing a shift in the global market, which it will need to address in its own domestic strategy. Even if the European Union were to delay its timeline for electrification, South Africa's auto industry will still soon be facing a world where the relative demand for ICE vehicles is declining rapidly in its top market. This will require renewed efforts to attract new investments from companies. One challenge, however, is that the country's limited adoption of EV passenger vehicles will be a disincentive for manufacturers from China, which have typically targeted investment in countries with growing demand, especially since developed markets such as the European Union have increasing concerns about transshipment from Chinese manufacturers. Finally, there are other considerations that might provide incentives to South Africa's leadership to take action to promote more EVs: Significant air pollution, estimated by some to cause thousands of deaths every year, continues to remain a significant public health and environmental challenge, further underlining the domestic importance of the transition.¹⁵²

EV Sales Growth in Other Developing Economies

The countries analyzed in this report were selected due to their importance as large emerging markets or because, like Costa Rica, they provide a useful model for how smaller economies might navigate the transition of the automotive sector. There are, however, multiple examples of

other developing and emerging markets that are moving forward on EV adoption and industrial development. Some of these were referenced in the framework outlined at the beginning of this report (see Figure 4), and further analysis of any of these cases could provide more insight into how the value chains are developing, the role of trade (and Chinese exports), and policy effectiveness.

Southeast Asia is a particularly active region for EVs. **Thailand** has positioned itself as an early leader in EV adoption, jumping from around 9,000 passenger EVs sold in 2021 to over 68,000 in only the first half of 2025 and reaching a 13 percent EV sales share in 2024, according to EV Volumes. Several policies have aided EVs in the country, including sales incentives. However, a key factor was the adoption between 2022 and 2023 of a trade and investment policy similar to the ones currently in place in Indonesia and recently introduced in India. By linking tariff-free trade of EVs to investment commitments, the Thai government has attracted investments from multiple Chinese OEMs that have opened plants in the country, including BYD, whose factory opened in July 2024, had assembled 10,000 EVs by November 2024, and planned to start shipping PHEVs to Europe in August 2025.¹⁵³ Although multiple EV marques are present in Thailand, Chinese brands perform particularly well, with BYD in particular accounting for over a third of EV sales in the country since 2023. What remains to be seen is how much of the value chain will be localized, whether Thai companies will benefit, and whether this can further enhance the country's manufacturing ecosystem.

Unlike Thailand, which is a strong automotive manufacturer and exporter with a relatively large domestic market for light-duty vehicles (almost 800,000 in 2024, according to EV Volumes data), **Vietnam's** position in the automotive market is easily overlooked. The country is not a particularly important producer of vehicles or components, and its market for passenger vehicles is relatively small (260,000 units sold in 2024).¹⁵⁴ However, domestic EV producer VinFast was able to build on existing local assembly capacity by acquiring GM's assembly plant; inheriting its distribution network; and, similar to Chinese EV makers, drawing on international expertise by working with international consulting firms. The company also benefited from high import tariffs into the country, which limited ICE vehicle manufacturers and tapped into growing battery assembly capacity within Vietnam. Most recently, many of Vinfast's sales appear to be in the car-hailing segment, and more specifically to GSM, a company owned by Vinfast itself. The company is bringing this model to India, Indonesia, Laos, and the Philippines as well.¹⁵⁵ Vinfast is also building factories in Indonesia and India.¹⁵⁶ There are some questions as to whether Vinfast's ambitious and debt-heavy approach will pay off in the long term, but it does appear to have rapidly transformed the domestic four-wheeler market and, if successful, would be an impressive example of a non-Chinese company applying the lessons from China to succeed in technological leapfrogging.

Farther afield, **Turkey** is another country that has taken a unique approach to EV adoption, largely through a mixed strategy that combines extensive and intensive growth aspects. Turkey has a decently sized automotive market, with over 1.2 million light vehicles sold in 2024, and it has historically been a production site with preferential access to European markets through its Customs Union agreement, which came into force in 1995.¹⁵⁷ This access to EU markets has attracted global automakers like Ford and Toyota to manufacture EVs in the country for export. BYD has also

committed to investment in the country, announcing a \$1 billion plant that aims to start production in 2026, reportedly aimed at exports to the European Union.¹⁵⁸ Like Vietnam, the country has established a domestic producer, named Togg (short for Türkiye'nin Otomobili Girişim Grubu). The company was formed by five large Turkish industrial firms—Anadolu Grubu, BMC, Kok Grubu, Turkcell, and Zorlu Holding—along with the Union of Chambers and Commodity Exchanges of Türkiye (TOBB) in 2018.¹⁵⁹ While Togg has opened an office in Germany, for now its sales are almost exclusively within Turkey. It remains a much smaller producer than even the likes of Vinfast, having sold just over 30,000 cars in Turkey in 2024. Meanwhile, Turkey is also increasingly importing cars from China: BYD had a more than 21 percent market share in the first half of 2025. This is despite the fact that Turkey introduced a 40 percent tariff on Chinese-made EVs in October 2024.¹⁶⁰ Turkey is therefore a good example of a country trying to balance domestic production, adoption, and a need to transition its exports in response to shifts in its main export market.

Most interviews conducted by the CSIS team for this report indicated that large emerging markets are lagging in the development of battery value chains. There is at least one exception: **Morocco** appears to be a recipient of new investment in battery components, specifically LFP cathodes, from several companies, primarily Chinese firms or, in the case of LG Chem, companies operating in partnership with a Chinese firm.¹⁶¹ Morocco's free trade agreements with the European Union and the United States have given it a strategic advantage in attracting this kind of investment. The country has also become an increasingly important automotive and component producer over the past decade, and by 2024 it had become the main supplier of cars to the European Union and by far the largest automotive producer in Africa.¹⁶² The country was estimated to have produced 700,000 vehicles in 2024 alone and produced several electric Stellantis models. Similar to Mexico, Morocco's domestic market, with fewer than 160,000 cars sold in 2024, is not a replacement for the export market.¹⁶³ Yet, as the country navigates the transition to producing EVs, its small number of EV sales is increasing and following a familiar trade-dependent pattern: In the first half of 2025, BYD accounted for 42 percent of new EV sales in the country.

Finally, it is worth noting that many countries find themselves in Costa Rica's position, with a limited domestic automotive industry combined with an interest in facilitating the rapid adoption of EVs due to long-term economic, environmental, and public health benefits. **Nepal** and **Ethiopia** may be the most extreme cases, although data is somewhat limited. Nepal's EV sales rate over the last year reached 76 percent according to one report, while estimates for Ethiopia, which has effectively banned the import of ICE vehicles, ranged between 40 and 60 percent in 2024.¹⁶⁴ Many emerging and developing markets are highly dependent on fuel imports. For all of the news coverage of the European Union's dependence on foreign gas and oil, it only accounts for 11 percent of the country's imports, compared to 32 percent for India and 23 percent for Nepal in 2024.¹⁶⁵ This will create strong incentives for several countries to consider moving more quickly toward electrification, especially if affordable vehicles will be easily available for import.

Conclusion

Emerging markets were once thought to be “catch-up” players in the global drive toward vehicle electrification. It is now clear that many of these markets are increasingly central players in the process and are thinking strategically about how to position themselves in the now global EV industry. Whether in terms of adoption rates, as many emerging markets have begun to overtake some of their developed peers, or in terms of manufacturing, as many developing countries have managed to bolster domestic firms or attract foreign investment, they have to a large extent outpaced expectations despite having smaller markets than many developed countries.

As this report has highlighted, emerging economies face vastly different challenges and constraints when it comes to promoting EV adoption. For many countries, affordable Chinese-made vehicles have shrunk the price gap between comparable ICE and EV models. This has made trade a viable path through which to increase adoption. However, for larger countries with existing manufacturing industries, trade-offs are more complex. Those with existing auto industrial bases face the dual tasks of incentivizing adoption while ensuring that their domestic industries can transition effectively. And for many countries, Chinese exports and investment are central to the industrial policy strategies being adopted.

For countries that have positioned themselves as manufacturers for a foreign market, the needle will be especially hard to thread as they face additional constraints based on their target market. Mexico, Morocco, and Turkey, for example, are leveraging their access to large markets to attract investment, but they are more vulnerable to sudden changes in policy and demand abroad. Mexico must also be cautious of proactively attracting Chinese investment due to the security concerns of

its northern neighbor. South Africa is struggling to adapt as its largest export market, the European Union, pushes for faster EV adoption and is itself grappling with how to balance domestic industry and trade with China.

For countries committed to creating a domestic industry, a further dilemma arises: whether they should empower domestic automakers or rely on foreign investment, particularly from newly internationalizing Chinese firms. For most countries, this question is simply a matter of degree: While some, such as India, have chosen to focus policy on creating domestic manufacturers, the dominance of Chinese firms in the upstream supply chain, particularly for batteries, means that some degree of reliance on Chinese value chains is inevitable in the short to medium term. And even in the long term, diversification of battery value chains demands far more investment in alternative chemistries, next-generation storage technology, and expanding production capacity outside of China than any single country can provide, requiring international cooperation at a time when international consensus is increasingly rare.

Others, such as Brazil and Indonesia, have leveraged their domestic markets to attract greenfield investment from Chinese companies, largely in auto assembly. While substantial, most of these investments are still in their early days, and the question remains just how committed Chinese OEMs are to creating durable and high-value-added investments in these new markets. Increased export controls on battery technology suggest that there may be some obstacles to achieving significant technology transfer.

Much will ultimately depend on the ability of those countries' governments to incentivize and require Chinese firms to localize more significantly, train local staff, support domestic value chains, and even transfer some technology and tacit manufacturing knowledge. It will also depend on whether they can attract and leverage foreign investment from non-Chinese firms that can help balance geopolitical and economic dependencies on China. Although there appears to be only limited competition to Chinese OEMs in emerging markets today, this could change as the market grows and more players emerge, including from emerging markets themselves.

There are some policy implications that can be drawn from the experience of emerging markets examined in this report. One is that the most effective path to increasing adoption rapidly is through a mix of policies that expand the supply of available models. The countries with higher adoption have typically experienced a rapid expansion of available models at affordable price points and growing competition through either trade policy or industrial policy. This is observable in all case studies analyzed except for South Africa.

In turn, a growing domestic market can provide countries with manufacturing scale and leverage to attract more FDI. Both countries with local OEMs and those reliant on FDI have benefited from a strong domestic market, which can also provide a base for expanding exports.

EVs made in China, either by Chinese or foreign OEMs, are highly competitive in terms of price and quality and are abundant in supply. This means that China is both an enabler and a challenger of other countries' EV transitions. Countries with favorable trade policies are likely to

see a rapid increase in the share of Chinese-made EVs, creating positive effects for adoption but potential challenges for supply chain and import diversification. However, countries aiming to become major EV exporters will face stiff competition from China, even if they welcome Chinese investment. Moreover, Chinese investment can present some complications for countries exporting to automotive markets such as the United States and potentially the European Union, which may increase scrutiny over imports and Chinese content.

Industrial policy can have transformational effects, but on average it is costly, uneven in its results, and difficult to implement. As a result, policymakers should consider the state of their existing industry and geopolitical priorities to assess whether industrial policy is worth pursuing and for what segments. This goes for every stage of the value chain, from mineral refining to auto parts to batteries and final assembly. An economy could still increase its resilience, economic returns, and climate outcomes, without targeting the localization of the full value chain. In other words, trade can actually enhance the effectiveness of industrial policy by, for example, facilitating access to inputs or helping expand the market.

The sooner policymakers have an implementable comprehensive strategy, the better. It may be tempting to double down on existing strengths in ICE auto production, but as a result producers could be left fighting over an increasingly crowded and shrinking global market. Moreover, the trends observed in several markets appear largely outside the control of any single government. As current levels of overcapacity in China's ICE vehicle manufacturing sector show, the transition will create stranded assets, so early planning will be important to avoid precipitous declines in employment.

The EV transition has accelerated markedly in the last few years, but the industry is still young, and as different governments embrace various strategies, much remains uncertain. Emerging market economies, however, are showing they are actively engaged in the future of the auto industry and how best to position themselves in it. The rest of the world, including the United States, will want to take heed and consider the implications of this trend for competitiveness and future innovation capacity, as well as closely follow China's growing role in emerging markets and the automotive and energy sectors globally.

These are all issues that Washington is grappling with as it seeks to retain a technological edge over China. As other countries adopt a strategic stance toward EVs and Chinese technology, the United States risks finding itself increasingly isolated and lagging in what is becoming a mainstream technology. However, a more proactive approach to collaborating with partner countries, including emerging markets, to invest in battery technology and supply chain diversification could bring shared benefits in terms of resilience and innovation. More broadly, the global rise of EVs demonstrates that emerging markets are taking an active stance on industrial policy and the transformation of the automotive sector, with important implications for the global diffusion of EV and battery technology.

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