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Policy Levers for Global South Electrification

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Global South Center for Clean Transportation at UC Davis

Driving equitable, science-based transitions in energy and mobility

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

The Center has four work pillars:

- Developing policies for transitions to zero-emission vehicles, including two-wheelers, buses, trucks, and cars
- Ensuring safe, sustainable supply chains and critical minerals for energy transitions
- Advancing sustainable fuels for transportation
- Unlocking access to finance for vehicle electrification

Learn more about our work at globalsouth.ucdavis.edu

Letter from the Editor

Around the world, countries in the Global South are navigating mobility transitions that reflect the complexities of geography, rapid urbanization, and inequality, but also a deep capacity for creativity, resilience, and innovation. The Global South Center for Clean Transportation was founded on the belief that safe and sustainable mobility is a shared right. Our work starts with the understanding that lasting solutions cannot simply be imported—they must be shaped by local insight and creativity. From this perspective, we aim to center the many ways in which countries in the Global South are developing context-specific solutions that the rest of the world can learn from just as much as contribute to.

We are very excited to launch Majority Mobility, a quarterly publication created to give these perspectives a dedicated space. Designed as a hybrid between a newsletter and a journal, each edition will include updates on the Global South Center's work alongside concise, technical articles from our research team and invited contributors from around the world, highlighting timely work aligned with that issue's theme. It will also feature "A View from the Ground"—short reflections from our government and industry collaborators who are driving sustainable mobility solutions in their countries, offering real-time insights into the implementation of clean mobility initiatives.

The theme for this first edition is "Policy Levers for Global South Electrification." Across emerging and developing economies, researchers and policymakers are testing new approaches to accelerate vehicle electrification while balancing local priorities such as affordability, reliability, and industrial development. In this issue, we feature contributions from partners advancing electrification policy in Brazil, Chile, Kenya, Mexico, and Southeast Asia.

In every edition, we hope to capture the diversity of pathways unfolding across the world's majority and to show how grounded, context-responsive solutions are shaping a cleaner and more inclusive future. We envision this as a collective effort, strengthened by the exchange of ideas and experiences across the regions we serve.

I invite you to read, contribute, and join us in building this conversation. Together, we can redefine what better mobility looks like when the majority of the world leads the design.

—Francisco A. Parés Olguín
Editor, *Majority Mobility*
Deputy Director, Global South Center for Clean Transportation, UC Davis

A Message from Chancellor Gary S. May

University of California, Davis

The challenges facing our world today—from climate change to economic inequality—demand transformative solutions. Nowhere is this truer than in the movement of people and goods. Clean, reliable, and affordable transportation is essential not only for economic opportunity but for the health and well-being of our planet and its people.

At UC Davis, we are proud to see the Institute of Transportation Studies advancing these solutions through the Global South Center for Clean Transportation. With more than 80 percent of the world's population living in developing nations, the work of this center is not just important; it's urgent. From accelerating electric mobility in Kenya and India to forging cross-border cooperation on zero-emission vehicles in Mexico, the Center is already helping shape cleaner, more equitable mobility systems across the Global South. It has earned recognition as a trusted research partner for governments, international organizations, and industry.

This work exemplifies UC Davis's public mission—to apply science in the service of society and to pursue innovation for the greater good. By extending California's climate leadership to the global stage, the Global South Center is not just making a difference but leading the way in creating a more sustainable future for all.

I am pleased to welcome you to the inaugural issue of Majority Mobility, the Global South Center's quarterly journal, which highlights the ideas, partnerships, and people driving this remarkable transformation.

Warmly,

Gary S. May
Chancellor, University of California, Davis

Welcome

I am pleased to share this message on the occasion of the launch of the inaugural quarterly journal from the Global South Center for Clean Transportation at the Institute of Transportation Studies, University of California, Davis.

Over the past year, the Centre played a pivotal role in bringing together leadership from the State of California, the Government of Kenya, the private sector, and a wide range of other partners, to build the foundations for the historic California–Africa Climate and Economic Partnership (CACEP).

The ambitious initiative, the first between Africa and California, began in December 2024 with the visit of the Californian delegation led by Toks Omishakin, State Secretary of Transport to Nairobi, soon followed by the reciprocal high level CACEP Forum in San Francisco officiated by the Lt. Governor of California in April 2025.

The visits identified mutual areas of cooperation in low carbon technologies including zero emission transport, green ports, sustainable fuels, renewable energy, energy efficiency, storage solutions, digital innovation, and climate smart agriculture. We had the opportunity to dig deeper into the cooperation priorities during the August 2025 visit of the California delegation hosted by the Government of Kenya, where we also shared the vision of the Africa Green industrialization Initiative (AGII) and Accelerated Partnership for Renewables in Africa (APRA).

The effort was crowned by the signing of a Memorandum of Understanding (MOU) between the two governments witnessed by President William Ruto and Governor Gavin Newsom at the margins of the 80th UN General Assembly in September this year broadly covering climate, technology, and trade.

The CACEP partnership is built around three interdependent foundations: policies that provide certainty and drive market transformation, technology that suits the realities of the Global South and led by local innovation, and finance that capitalises on the reduced risk created by sound national policies. Together, these elements have the potential to unlock major opportunities for investment and capital flows into Kenya and across the African continent.

As a $4 trillion economy, California is a global incubator for inspiring new ideas, groundbreaking policymaking and climate leadership. Africa shares this spirit, addressing climate vulnerabilities while preserving the goals of economic development. The 2023 African Leaders Nairobi Declaration adopted at the inaugural Africa Climate Summit cemented Africa's position as an integral part of global solutions, a viable climate positive investment destination and indispensable trading and industrial partner to decarbonise the global economy. This climate and economic partnership with California opens new possibilities for mutually beneficial investment that can accelerate both clean energy and digital transitions across key sectors including transportation, energy, agriculture and health.

I very much appreciate and welcome the commitment of UC Davis to take forward the implementation of the MOU through the launch of the Africa Clean Transportation (ACT) Initiative in Nairobi. The ACT initiative will see the establishment of a Centre of Excellence on Sustainable Transportation in partnership with the Government of Kenya and African universities, with the aim of accelerating policy, technology, and finance pathways for zero-emission and equitable mobility.

There remains much work ahead, but with partners like the Global South Center, I am confident that we can together build the knowledge, tools, and shared commitment to achieve our common goals of sustainable transportation networks that deliver benefits to the people of Kenya, Africa, and across the Global South.

Ambassador Ali D. Mohamed
Special Envoy on Climate Change
Executive Office of the President, Republic of Kenya

Vehicle Efficiency Standards in the Global South: Lessons from Chile's Pioneering Experience

Sebastián Galarza
Executive Director, Centro de Movilidad Sostenible, Chile

Ignacio Rivas
Program Director, Centro de Movilidad Sostenible, Chile

Introduction

Globally, the transition towards a low-carbon economy requires a profound transformation of the transport sector. Transport remains heavily dependent on fossil fuels and is one of the largest global emitters of greenhouse gases (GHG),[1] severely impacting urban air quality, with direct consequences for public health and the livability of our cities. Improving vehicle efficiency and incorporating low-emission vehicles is therefore essential to meet climate commitments and improve our quality of life.

For countries in the Global South, many of which are experiencing rapid vehicle fleet growth,[2] the adoption of clean transport policies is critical to close the gap with developed markets. In this context, Chile has emerged as a relevant case study with the implementation of mandatory energy efficiency standards for light-duty vehicles beginning in 2024.

This article aims to analyze the design and implementation process of Chile's regulation, from concept to its first visible impacts. It highlights the Chilean experience to extract lessons that can be adapted in other contexts facing similar challenges and opportunities to decarbonize transportation.

Context and Challenges: The Need for Standards in Chile

The transport sector in Chile accounts for 34.1% of national energy consumption[3] and is among the most carbon-intensive sectors in the economy, producing roughly 26% of Chile's total GHG emissions.[4] Chile has recently made progress in local pollutant regulations by adopting stringent emission standards to reduce criteria pollutants such as NOx and PM. However, energy efficiency has stagnated: between 2013 and 2019, the average annual improvement in fuel economy for new vehicles was only 0.83%, far below the 2.6% annual improvement seen in Organization for Economic Cooperation and Development (OECD) countries in the previous decade.[5]

A major regulatory milestone came with the introduction of energy efficiency labeling for new vehicles in 2013,[6] which allowed for the collection of objective fuel economy data and laid the foundation for future regulatory decisions. Shortly thereafter, a green vehicle tax was introduced to reduce transport-related criteria pollutants. However, the impact of these policies has been limited due to the informational nature of the energy efficiency labeling and loopholes in the green vehicle tax.

In 2021, the approval of the Energy Efficiency Law No. 21.305 granted the Ministry of Energy, for the first time, the legal authority to set mandatory fuel

1 Intergovernmental Panel on Climate Change (IPCC). (2014) "Climate Change 2014: Mitigation of Climate Change: Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change." Cambridge University Press. https://www.ipcc.ch/report/ar5/wg3/

2 International Organization of Motor Vehicle Manufacturers. (2023) "Production statistics: 2023." https://oica.net/production-statistics/

3 Ministerio de Energía (2023) "Balance Nacional de Energía 2023." Santiago, Chile. http://energiaabierta.cl/visualizaciones/balance-de-energia/

4 Ministerio del Medio Ambiente. (2020) "Inventario Nacional de Gases de Efecto Invernadero (INGEI)." Santiago, Chile. https://bibliotecadigital.ciren.cl/items/13c81cf2-36fb-40a7-ab76-c4521a119335

5 Ministerio de Energía. (2022) "Informe Técnico Definitivo para el Establecimiento del Estándar." Santiago, Chile. https://energia.gob.cl/consultas-publicas/informe-tecnico-preliminar-para-el-establecimiento-del-estandar-de-eficiencia-energetica-vehicular-de-vehiculos-motorizados-medianos

6 Ministerio de Energía. (2017) Decreto 61 - Reglamento de etiquetado de consumo energético para vehículos motorizados livianos y medianos. Santiago, Chile. [Decree] https://www.bcn.cl/leychile/navegar?idNorma=1042535&idParte=0

Table 1. Summary of Chile's Light-Duty Vehicle Efficiency Standard

Feature	Description
Type of Standard	Energy efficiency (measured in km/lge)
Targets	Targets A mass-based curve per importer: • Stage 1: 18.8 km/lge (2024–2026). • Stage 2: 22.8 km/lge (2027–2029). • Stage 3: 28.9 km/lge (2030 onward).
Regulated Vehicles	New vehicles up to 2,700 kg.
Penalties	Brands failing to meet the average fuel economy target must pay up to 0.2 UF* per 0.1 km/lge below the target, multiplied by the number of vehicles sold.
Credits and Flexibilities	Credit trading: No. Banking/Deficit: No. Multipliers: Yes (3x for BEVs and PHEVs). Other: Excess compliance can offset the next year's deficit. BEV medium-duty vehicles <2,700 kg (excluding battery) may count as light-duty.

**Approximately USD 8.4 (UF: Unidades de Fomento).*

economy standards for light-, medium-, and heavy-duty vehicles.[7] This regulation aims to support Chile's national climate goals and enhance the country's energy competitiveness.

Design of Light-Duty Vehicle Fuel Economy Standards

Chile's light-duty vehicle energy efficiency standard establishes mandatory fleet-average performance targets, measured in kilometers per liter of gasoline equivalent (km/lge). These targets are calculated by brand and importer based on annual vehicle type approval data, through the Ministry of Transports Center for Vehicle Certification and Compliance (3CV). The standard sets a trajectory of increasingly stringent targets, requiring continuous market improvement with a 21% increase in efficiency from the first to the second stage, and a further 27% increase for the third stage, as shown in **Table 1**.

One key design incentive is the use of a **technology multiplier**: each battery electric vehicle (BEV) or plug-in hybrid (PHEV) may count up to three times in calculating an importers average fuel economy, directly encouraging the adoption of zero-emission technologies. Nevertheless, compared to leading markets like the European Union or Japan, Chile's target is less stringent.[8]

Policy Development Process

The standard was developed by the Ministry of Energy in collaboration with the Ministry of Transport and Telecommunications and the Superintendency of Electricity and Fuels. It underwent national public consultation in September 2021 and the Ministry of Energy notified the World Trade Organization of it in October 2021. The standard received comments from 19 stakeholders, which were incorporated into the final design.[9]

The km/lge metric was chosen to align with the existing vehicle labeling system and to simplify enforcement using already available data. A gradual target trajectory was set to allow market adaptation.

A critical design choice was selecting vehicle mass as the core technical descriptor over its main alternative,

7 Ministerio de Energía. (2021) Ley 21.305 de Eficiencia Energética. Santiago, Chile. [Law] https://www.bcn.cl/leychile/navegar?idNorma=1155887

8 International Council on Clean Transportation. (2025) "Passenger vehicle greenhouse gas emissions and fuel consumption." https://theicct.org/pv-fuel-economy/

9 Ministerio de Energía. (2021) "Consolidación y respuesta: Proceso de consulta ciudadana del "Informe técnico preliminar para el establecimiento del estándar de eficiencia energética vehicular de vehículos motorizados livianos." Santiago, Chile. https://energia.gob.cl/consultas-publicas/informe-tecnico-preliminar-para-el-establecimiento-del-estandar-de-eficiencia-energetica-vehicular-de-vehiculos-motorizados-medianos

the vehicle footprint. The decision was based on mass having a stronger statistical correlation with fuel efficiency for the Chilean fleet,[10] its alignment with most international standards outside North America, and crucially, its independent verification by the national certification authority. Prioritizing an officially measured metric was essential for building a robust enforcement framework and eased concerns over local industry compliance.

Initial Results of the Light-Duty Standard

Contrary to initial industry concerns, the implementation of the law has already shown tangible results, particularly in reshaping vehicle offerings in Chile. During its first year, the market-wide fleet average reached 18.7 km/lge, nearly meeting the 18.8 km/lge goal. This result demonstrates the policy's design functioning as intended. While 16 of the 29 importers did not meet the standard individually, the over-compliance from other importers was sufficient to lift the entire market's performance.[11]

A major transformation has been seen in the range of new models. Anticipating the law's implementation, the market began to adjust as early as 2021. The average efficiency of newly type-approved vehicles jumped by 41%, from 16.2 km/lge in 2022 to 22.9 km/lge in 2024.[12] This shift is largely technological: in 2022, fewer than 7% of new models were BEVs or PHEVs; by 2024, that figure rose to 25%. As **Figure 1** shows, this diversification has been essential in reducing average emissions from 161 to 138 gCO2/km. Without low and zero-emission models, emissions would have remained stagnant.

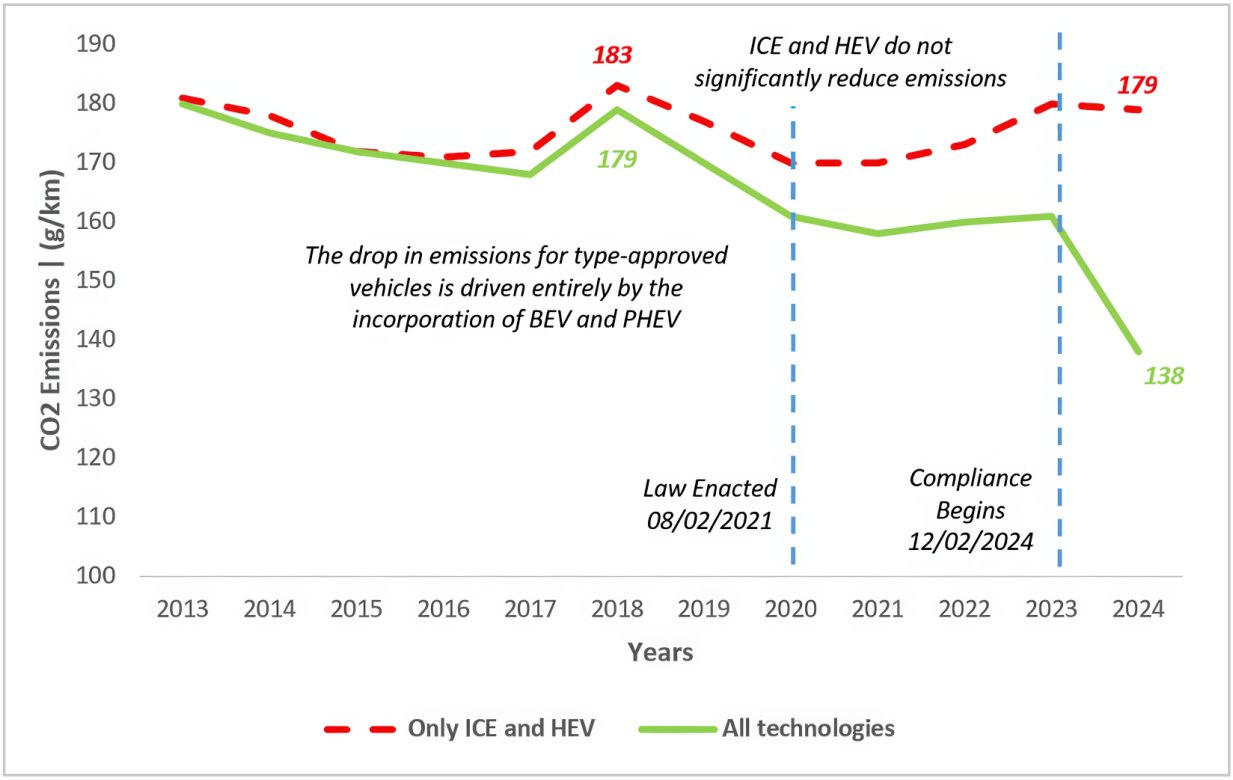

Figure 1. Average CO2 emissions per kilometer for type-approved light-duty vehicles by year.[13] ICE, internal combustion engine; HEV, hybrid electric vehicle.

10 Ministerio de Energía. (2022) "Informe Técnico Definitivo para el Establecimiento del Estándar de Eficiencia Energética Vehicular de Vehículos Motorizados Livianos." Santiago, Chile. https://energia.gob.cl/consultas-publicas/informe-tecnico-preliminar-para-el-establecimiento-del-estandar-de-eficiencia-energetica-vehicular-de-vehiculos-motorizados-medianos

11 Centro de Movilidad Sostenible. (2025) "Dashboard: Cumplimiento e impacto de la Ley de Eficiencia Energetica." https://lookerstudio.google.com/u/1/reporting/75e09310-3b6c-4ba9-b698-190ae11e9043/page/p_3ypejszgod

12 Same as 11 above.

13 Centro de Movilidad Sostenible. (2025) "Dashboard: Cumplimiento e impacto de la Ley de Eficiencia Energetica." https://lookerstudio.google.com/u/1/reporting/75e09310-3b6c-4ba9-b698-190ae11e9043/page/p_3ypejszgod (same as 11 above)

This transformation is beginning to influence actual sales. Light-duty EV sales rose from 0.67% of total sales in 2023 to 1.87% in 2024. While market share remains small, the growth rate is encouraging.

In terms of real-world performance, the average for all vehicles sold in the first year (without multipliers) was 16.6 km/lge and 150.4 gCO2/km — a 6% improvement in efficiency and 2% drop in emissions from 2023. These gains translate into tens of millions of dollars in annual national fuel savings—important to Chile as an oil importing country.

The low sales of these type-approved, highly efficient models are worth noting. However, this should not be seen as a policy failure but rather as an expected outcome in the initial phase of the regulation. The first objective is to transform the vehicle portfolios offered by importers, and the next challenge is to increase sales by encouraging consumer demand for this more efficient and cleaner product mix.

The regulation allows for varied corporate compliance strategies. Some brands comply through sales of more efficient combustion vehicles, while others offset inefficient offerings with strategic sales of pure EVs—demonstrating market adaptability to the policy.

Lessons Learned and Future Outlook

The regulation's rollout was first met with skepticism. The automotive industry initially forecasted up to $97 million in fines, arguing the law would be merely punitive, given the impossibility of compliance.[14] Yet, in its first year, the market nearly met the legal target (18.7 vs. 18.8 km/lge), and newly type-approved models reached 22.9 km/lge—demonstrating policy effectiveness and shifting perceptions. Today, the industry views the regulation as a valuable tool to negotiate the import of more efficient, especially electric, vehicles.[15]

Looking ahead, challenges and opportunities remain. Increasingly ambitious targets for 2027 and 2030 will require a higher share of zero-emission vehicle sales. Additionally, the switch from NEDC to WLTP test cycles[16]—more rigorous[17] and globally accepted—will result in lower reported fuel economy for the same models, though the gap may be smaller than expected due to global optimization for WLTP.

To accelerate emissions reductions, Chile could introduce enhancements to the policy, initially designed for simplicity. These include:

- Creating a credit-trading market (e.g., California's ZEV credit trading system) to reward over-compliance and reduce costs for consumers;
- Adjusting the PHEV multiplier from 3x to 1x to better reflect real-world fuel use[18]; and
- Strengthening the future targets beyond 2027.

Such adjustments are crucial for aligning the market trajectory with Chile's goal of 100% zero-emission light-duty vehicle sales by 2035.

Conclusion and Looking Ahead

Chile's experience with light-duty vehicle efficiency standards demonstrates that ambitious and effective regulations are possible in the Global South. Despite early skepticism, the standard met its target in year one and spurred significant market transformation by accelerating the adoption of cleaner technologies and laying the groundwork for deeper decarbonization.

The standard is not a stand-alone measure but part of a broader strategy to deploy EVs and increase energy security in the country. The next step is to expand this success by implementing standards for medium- and heavy-duty vehicles—essential for addressing the full scope of road transport emissions in the country.

Chile's journey offers a valuable roadmap for countries facing similar challenges. It demonstrates that political will, solid technical design, and strong collaboration between government, industry, and civil society can make a real difference. With phased implementation, even complex barriers can be overcome to drive more sustainable practices. The final takeaway message is clear: the transport energy transition in the Global South is not only necessary—it is achievable.

14 Espinosa, M. (2023) Sector automotriz prevé pago de multas por US$ 97 millones por obstáculos para cumplir la ley de eficiencia energética. Diario Financiero. https://www.df.cl/sector-automotriz-preve-pago-de-multas-por-us-97-millones-por

15 Centro de Movilidad Sostenible. (12 May 2025) Webinar: Ley de Eficiencia Energética Chilena: Resultados del Primer Año. https://www.youtube.com/watch?v=39IFw_KZEvU

16 NEDC (New European Driving Cycle) and WLTP (Worldwide Harmonized Light Vehicles Test Procedure) are standardized test cycles used to measure vehicle fuel economy and emissions.

17 International Council on Clean Transportation. (2020) "On the way to 'real-world' CO2 values: The European passenger car market in its first year after introducing the WLTP." https://theicct.org/publication/real-world-co2-emission-values-vehicles-europe-jan24/

18 International Council on Clean Transportation. (2022) "Real world usage of plug-in hybrid vehicles in the United States." https://theicct.org/publication/real-world-phev-us-dec22/

Moving Beyond Incentives: The Role of Supply-Side Regulations in South and Southeast Asia's EV Transition

Aakansha Jain, PhD
Senior Researcher, UC Davis, Global South Center for Clean Transportation, United States | India

Supply side regulations including fuel economy regulations, CO2 emissions standards, and zero-emission vehicle (ZEV) mandates have become a critical instrument for accelerating the transition to efficient vehicles and advancing sustainable transportation goals. For major automobile-producing countries in the Global South, expanding internal combustion engine (ICE) production to meet rising consumer demand risks reinforcing dependence on technologies that are becoming less competitive as global markets shift toward electric vehicles (EVs). In contrast, countries that are proactively investing in EV manufacturing and supply chain development are better positioned to strengthen the global competitiveness of their domestic automotive sectors. Supply side regulations provide long-term market signals to manufacturers, encourage investment in EV production, and reduce reliance on demand-side subsidies. For South and Southeast Asia (SSEA),[1] strengthening supply side regulations and establishing a regional EV supply chain framework can help reduce reliance on imported vehicles and components, accelerate ZEV adoption, enhance industrial competitiveness, and deepen economic integration.

Rising Energy Demand and Emissions

The transport sector is the second-largest energy consumer in the Association of Southeast Asian Nations (ASEAN) region, with road transport accounting for approximately 136 Mtoe (million tons of oil equivalent) in 2022. In the absence of any regulatory intervention, continued growth in vehicle ownership is expected to result in a 2.6-fold increase in sector's energy consumption by 2050.[2] This growing demand has direct implications for energy security, particularly in countries with high oil import dependence. Oil products account for more than 87% of the transport sector's final energy use in major SSEA economies, with import dependency particularly high in India (0.89), Thailand (0.84), and Vietnam (0.68).[3] Transport sector emissions show a similar upward trajectory. In 2015, the sector contributed roughly 25% of the region's energy-related CO2 emissions (342 MtCO2e) and is projected to reach ~870 MtCO2e by 2050, growing annually at 3.3%.[4]

Compounding these challenges is the global shift toward larger, less efficient vehicles. Sport utility vehicles (SUVs) now exceed 70% of light-duty vehicle (LDV) sales in most SSEA markets, with India and Vietnam among the fastest-growing, where the share of large LDVs increased by 37% and 32%, respectively, between 2015 and 2024.[5] Cazzola et al.[6] estimate that between 2010 and 2022, fuel consumption per kilometer could have declined 30% faster if vehicle sizes had remained unchanged. Instead, SUVs now consume about 20% more oil than medium-sized passenger cars and their uptake accounted for one-third of global growth in oil demand between 2022 and 2023.

1 SSEA region includes India, Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam
2 ASEAN Centre for Energy (ACE). (2024) 8th ASEAN Energy Outlook (AEO8) (Vol. 8). Jakarta: ASEAN Centre for Energy. https://aseanenergy.org/publications/the-8th-asean-energy-outlook/
3 Estimates based on data from IEA (2024), World Energy Balances.
4 ASEAN Secretariat. (2019). ASEAN regional strategy on sustainable land transport. Jakarta: ASEAN Secretariat. https://asean.org/book/asean-regional-strategy-on-sustainable-land-transport/
5 Estimates based on LDV sales data from MarkLines
6 Cazzola P, Paoli L, Teter J. (2023) "Trends in the Global Vehicle Fleet 2023: Managing the SUV Shift and the EV Transition." Global Fuel Economy Initiative. https://www.globalfueleconomy.org/data-and-research/publications/trends-in-the-global-vehicle-fleet-2023

EV Policy Landscape and Market Response

Governments in the South and Southeast Asia (SSEA) region have introduced a range of technological, infrastructural, and policy measures aimed at promoting cleaner transportation systems. Recent market trends reflect the early impact of these initiatives. From less than 1% in 2019, EVs accounted for approximately 6% of LDV sales in Indonesia, 13% in Thailand, and 22% in Vietnam in 2024, while in Singapore nearly 30% of new cars sold were electric (**Figure 1**). This rapid growth in EV uptake is an opportunity for SSEA to leapfrog legacy ICE technologies and establish itself as a competitive EV hub.

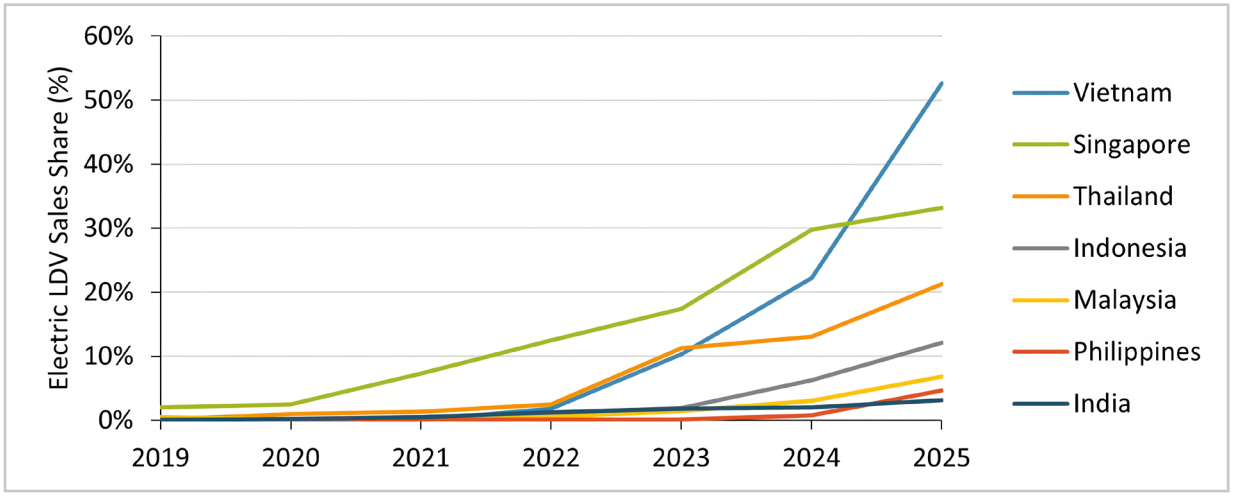

Figure 1. EVs as a share of LDV sales by market from 2019 to 2025 in SSEA countries.
Data Source: MarkLines and EV Volumes
Note: Data for 2025 shows H1 sales share

The acceleration in EV uptake is closely linked to ambitious national targets and supportive policy ecosystems. India aims for 30% EV sales by 2030, Thailand has set a goal for 30% of domestic vehicle production to be electric by the same year, and Vietnam targets a 30% share of EVs in-use for cars (**Figure 2**). These goals are being advanced through fiscal incentives, including tax exemptions, purchase subsidies, and charging infrastructure investments. India's 2024 Scheme for Promotion of Manufacturing of Electric Passenger Cars (SPMEPCI) seeks to attract global EV manufacturers and build domestic production capacity. Indonesia has increased minimum local content requirements from 35% in 2021 to 80% by 2030 to strengthen its position in the EV supply chain. On the demand side, Thailand provides subsidies of approximately USD 750 to USD 3,000 for domestically produced EVs, while Malaysia offers a 70% income tax exemption for three years to firms investing in EV charging installation, maintenance, and services, helping accelerate infrastructure rollout.

> For major automobile-producing countries in the Global South, expanding internal combustion engine (ICE) production to meet rising consumer demand risks reinforcing dependence on technologies that are becoming less competitive as global markets shift toward electric vehicles (EVs).

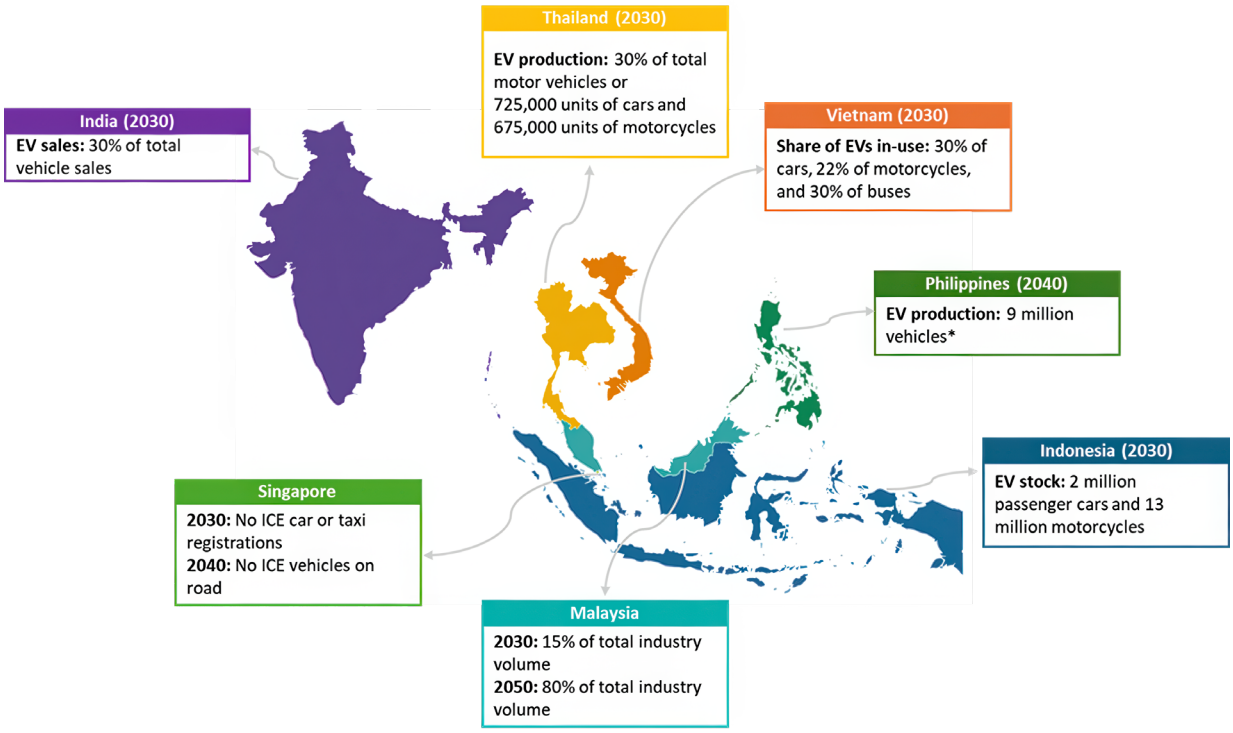

Figure 2. EV goals/targets in the SSEA region.[7]

Strengthening domestic production and supply chains is equally critical for industrial competitiveness and long-term value creation. Domestic policy measures are reshaping global Original Equipment Manufacturers (OEM) strategies, driving investment shifts and early positioning in local EV markets. Chinese automakers are rapidly scaling up both EV and ICE production, with a strong presence in Thailand, Indonesia, Malaysia, and Vietnam. In Thailand, Chinese companies now account for approximately 75% of the EV market.[8] SAIC-GM-Wuling has localized Air EV production in Indonesia and expanded into Vietnam through a partnership with TMT Motors.[9,10] Japanese automakers, traditionally dominant in ICE and hybrid markets, are accelerating investments in battery electric vehicles to remain competitive. Toyota Kirloskar and Maruti Suzuki, for example, have each announced plans to establish new EV plants in India, with investments of roughly USD 400 million each.[11,12] Korean automakers,

7 Data sources:
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8 Tech in Asia. (2025a, July 4). Chinese EV maker Neta faces tough EV competition in Thailand. https://www.techinasia.com/news/chinese-ev-maker-neta-faces-tough-ev-competition-in-thailand

9 GM Authority. (2022, August 9). Production of all-new Wuling Air EV started in Indonesia. https://gmauthority.com/blog/2022/08/production-of-all-new-wuling-air-ev-started-in-indonesia/

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12 Maruti S. (2024, January) MS plans more investments in Gujarat with a new greenfield plant. https://www.marutisuzuki.com/corporate/media/press-releases/2024/january/ms-plans-more-investments-in-gujarat-with-a-new-greenfield-plant?srsltid=AfmBOooBDzRi0asuMA56c0xQ02vYbLoVTb903PcwDmBdo00WjYpeiGWI

meanwhile, are leveraging integrated battery partnerships.

Strengthening Regulatory Frameworks for Sustainable EV Transition

Despite ambitious EV targets, regulatory frameworks in the region remain limited in stringency, enforcement, and alignment with global best practices. Most countries lack binding performance-based standards, segment coverage, and compliance mechanisms, with India being the only country to have adopted Corporate Average Fuel Economy (CAFE) regulations. Without supply side regulations in place, the region risks slowing EV uptake and limiting its ability to attract long-term strategic investment from global OEMs. Unlike China, the EU, and California—where automakers operate under clear, enforceable ZEV adoption and fleet-wide CO2 targets—SSEA continues to rely on short-term fiscal incentives that support early market development but are not sustainable in the long term. The following regulatory and institutional measures will be central to enabling a sustained transition toward efficient and zero-emission vehicles:

1. **Adopt binding standards and harmonize measurement procedures:** Countries should move beyond voluntary programs by introducing enforceable fleet-wide fuel economy and emissions reduction targets for all LDV classes—including SUVs, pick-up trucks, and luxury segments—which significantly contribute to emissions. To ensure these standards are credible and internationally comparable, ASEAN member states should progressively align with the measurement procedures defined under UN Regulation 154 (Worldwide Harmonized Light-Vehicle Test Procedure [WLTP]), which provides a more accurate and technology-neutral framework for assessing CO2 emissions and fuel consumption than older test cycles do.
2. **Improve enforcement, compliance, and monitoring mechanisms:** The experiences of the EU and Australia demonstrate that the effectiveness of fuel economy regulations relies on strong enforcement mechanisms and substantial penalties for non-compliance. In both countries, industry failed to meet the voluntary fuel-economy/CO2 standard targets until mandatory standards with financial penalties were enacted, after which compliance improved significantly. As countries develop supply side regulations, it is crucial to ensure that flexibilities are designed effectively to drive real improvements in ICE vehicle efficiency and increase EV adoption. Super credits and off-cycle credits if set generously high can significantly impact the effectiveness of CO2 reduction target allowing manufacturers to meet compliance requirements without meaningful progress.13,14 Establishing robust Measurement, Reporting and Verification frameworks will also be essential to ensure that manufacturers meet fuel economy regulations and publicly disclose vehicle efficiency data to enhance transparency and create consumer awareness, driving demand for more efficient vehicles.
3. **Prevent regulatory free riding:** Evidence from North America shows that even in regions where stringent ZEV mandates have led to significant EV market growth, spillover effects remain limited. Free riding on another region's regulations does not result in sufficient EV adoption to meet long-term decarbonization targets (Sykes and Axsen, 2017).15 This underscores the need for each country in the SSEA region to establish its own regulatory frameworks to drive EV uptake, rather than relying on global market forces or external policies.
4. **Enhance regional cooperation to standardize regulations and accelerate the EV transition:** Harmonizing EV standards, including vehicle inspection protocols, charging infrastructure compatibility, battery management, and end-of-life disposal regulations would reduce regulatory fragmentation, making it easier for manufacturers to produce vehicles that meet a consistent set of requirements across borders. Leveraging regional trade agreements under ASEAN, along with bilateral and inter-regional partnerships such as the Comprehensive Economic Partnership Agreement (CEPA) and the ASEAN - China Free Trade Area (CAFTA) will also be key to integrating supply chains across borders, reducing production costs, mitigating supply chain vulnerabilities, and creating economies of scale. Public-private partnerships in battery research and development, charging deployment planning, and workforce development can further support the region's long-term industrial competitiveness.

13 Wang S, Zhao F, Liu Z, Hao H. (2018) Impacts of a super credit policy on electric vehicle penetration and compliance with China's Corporate Average Fuel Consumption regulation. Energy, 155, 746-762. https://doi.org/10.1016/j.energy.2018.05.042

14 Yang Z, Bandivadekar A. (2017) "Light-duty vehicle greenhouse gas and fuel economy standards." ICCT report, 16. https://theicct.org/wp-content/uploads/2021/06/2017-Global-LDV-Standards-Update_ICCT-Report_23062017_vF.pdf

15 Sykes M, Axsen J. (2017) No free ride to zero-emissions: Simulating a region's need to implement its own zero-emissions vehicle (ZEV) mandate to achieve 2050 GHG targets. Energy Policy, 110, 447-460. https://doi.org/10.1016/j.enpol.2017.08.031

Guiding Public Policy and Governance for the Transition to Electric Mobility: Lessons from Latin America for the Global South

Tatiana Bermúdez-Rodríguez[1]

Senior Researcher, São Paulo Center for Energy Transition Studies (CPTEn) and University of Campinas (UNICAMP) Laboratory of Electric Vehicle Studies (LEVE), Brazil

Latin America's transport sector accounts for nearly 39 percent of regional greenhouse gas (GHG) emissions. In a region where nearly 80 percent of the population lives in cities, transport is also a central driver of air pollution and related health problems.[2] In this context, the electrification of urban mobility has emerged not only as a climate mitigation strategy, but also as a public health and competitiveness strategy, with the potential to improve quality of life, productivity, and social welfare.

However, in the Global South, and particularly in Latin America, the transition to electromobility is not primarily a technological challenge. It is a governance challenge. Experiences across Latin America shows that electrification does not materialize automatically, even when the technology is available. It emerges when institutional capacity, regulatory design, and policy alignment reduce uncertainty and stabilize expectations among actors.

National long-term vision and electric vehicle (EV) targets: the policy lever that unlocks the transition

A core lesson from Latin America is that nationally anchored public policies, when aligned with local initiatives, are essential to overcome market barriers and technological uncertainty. Two contrasting pathways are visible: an active, vision-driven approach exemplified by Chile and Colombia, and a fragmented approach in Brazil.

Territories with increasing electromobility have institutional policies to support it, through explicit national strategies and legislation. Chile pioneered its National Electromobility Strategy in 2017 (updated in 2022), setting the ambitious goal of achieving 100 percent electric urban public transport by 2035, reinforced by supply-side regulations (SSRs) such as fuel-economy standards. Colombia's Law 1.964 (2019) mandates the same zero-emission goal for its urban bus fleet by 2035. These clear political signals legitimize the technology, reduce investor uncertainty, and translate targets into stable regulatory frameworks, ensuring policy continuity across electoral cycles and effectively turning targets into state policy.[3]

In contrast, Brazil, despite its robust industrial base and large economy, still lacks a unified national strategy for electromobility and mandatory EV targets. Recent federal programs—such as the MOVER Program,[4] the New Growth Acceleration

1 Ph.D. in Science and Technology Policy, University of Campinas, Brazil; Researcher at the São Paulo Center for Energy Transition Studies (CPTEn) and the Laboratory of Electric Vehicle Studies (LEVE) at University of Campinas (UNICAMP). E-mail: ladytb@unicamp.br

2 United Nations Development Programme (UNDP). (2025) "Low-emission transport to achieve the Paris Agreement in Latin America and the Caribbean. Progress and recommendations." https://climatepromise.undp.org/research-and-reports/low-emission-transport-achieve-paris-agreement-latin-america-and-caribbean

3 Consoni F, Bermúdez-Rodríguez T, Olviera Filho AA, Barassa E, Navarro A. (2024) As cidades como protagonistas. Políticas públicas de transição para a mobilidade elétrica. Editora Papagaio. São Paulo. ISBN 978-65-89810-20-9

4 The MOVER Program (2024) regulates GHG emissions and provides incentives for commercializing new vehicles with higher energy efficiency. Starting June 1, 2025, new vehicles sold or imported in Brazil must comply with minimum energy efficiency and CO_2 emission standards. These regulations promote low-carbon technologies (e.g., flex-fuel, hybrid, and EV) by setting clear metrics for tank-to-wheel (km/L or MJ/km) and well-to-wheel (gCO_2e/km) efficiency.

Program (Novo PAC),[5] and New Industry Brazil[6]—are important steps forward. Yet federal action remains fragmented across cities and states. As a result, multiple technological pathways (including biofuels and hybrid EVs) coexist without clear prioritization or a national consensus capable of guiding industry and investment.[7]

In this context, long-terms targets are a core supply side regulation (SSR) for enabling the transition to electromobility. By providing long-term strategic direction, targets align actors, reduce uncertainty, and attract investment into high-cost segments. However, targets alone are insufficient. Their effectiveness depends on robust institutional coordination across sectors (transport, energy, finance) and across jurisdictions (national, state, local). Without coherent articulation, targets risk becoming symbolic rather than transformative. For the Global South, the lesson is clear: no transition without targets, and no impact without coherence at multiple levels of government.

Battery-electric buses before Teslas: Latin America's strategic choice

Unlike in Global North countries, where light-duty electric vehicles (LDVs) lead the transition, in Latin America, the most meaningful EV penetration is unfolding through battery-electric buses (BEBs). This strategy delivers immediate public health benefits by reducing local air pollution in dense urban areas and creates strategic opportunities to modernize public bus fleets. In addition to lower operating and maintenance costs, BEBs can make fares more affordable and improve service quality, while reducing noise and vibration for passengers and drivers.

BEB deployment addresses three uniquely Global South imperatives[8]: i) immediate air-quality relief: replacing diesel buses in cities such as Santiago, Bogotá, and São Paulo delivers instant public health gains; ii) a scalable decarbonization lever: public transport contributes a disproportionately large share of CO_2 emissions, making electrification a high-impact intervention; and iii) governability: because public bus fleets are procured in bulk, via concessions, tenders, or leasing structures, governments can accelerate technology substitution through regulatory design. To illustrate the centrality of BEBs in the region, **Figure 1** shows the stock of BEBs in the main Latin American countries and cities as of November 2025.

Cities as protagonists in the transition to electromobility

Latin American cities are not passive recipients of national strategies; they are the primary protagonists

> Latin America's experience shows that technology alone does not drive transitions, policy does. When targets are binding, finance is innovative, and governance is coherent, electrification accelerates even in resource-constrained contexts.

5 Within the scope of this program, the Ministry of Cities leads initiatives in partnership with states and cities committed to transitioning their public transport fleets to BEBs and Euro VI diesel buses through the financial incentives. In this initial phase, the program aims to support the acquisition of 2296 BEBs to renew Brazil's urban transportation system. Presidência da República. (2024). Learning about New PAC program. https://www.gov.br/casacivil/pt-br/novopac/conheca-o-programa.

6 This industrial policy sets specific targets for six missions, including Mission 3, which focuses on Sustainable Mobility. The priority areas of this mission include the advancement of electromobility and the development of a national battery supply chain for electric vehicles. Ministério do Desenvolvimento. (2024) Missão 3 tem R$ 1,6 tri para cidades sustent´aveis e mobilidade verde entre recursos públicos e privados. Indústria, Comércio e Serviços. https://www.gov.br/mdic/pt-br/assuntos/noticias/2024/outubro/missao-3-tem-r-1-6-tri-para-cidades-sustentaveis-e-mobilidade-verde-entre-recursos-publicos-e-privados.

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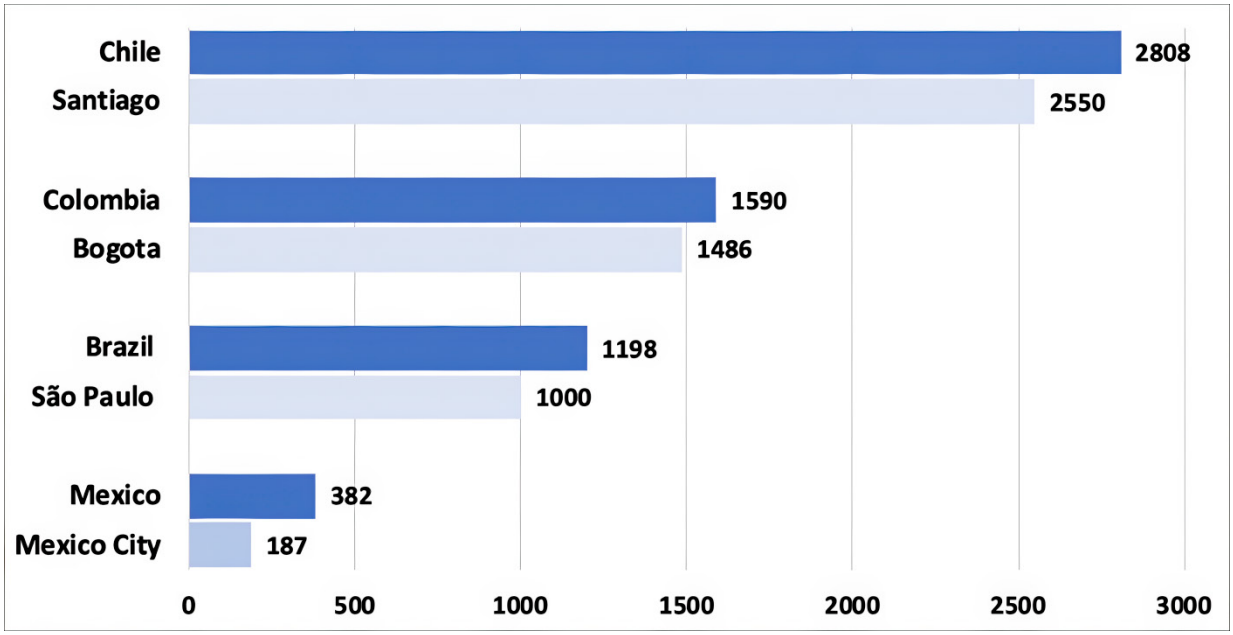
driving the transition to electromobility. Concentrating both economic activity and pollution, cities have the strongest incentives to decarbonize transport. Local governments hold regulatory authority over urban mobility planning and the organization of public transport services.

This leadership capacity becomes tangible through municipal regulation and target-setting. Cities can impose emissions and noise-control standards, embed climate goals into tendering processes, and shape technology adoption through procurement rules. The most notable example is São Paulo, Brazil, which operates a fleet of 13,000 buses. According to the Climate Law of 2009 (Law 14,933), Article 50 mandates that by 2018, the entire bus fleet must use non-fossil renewable fuels.[9] In 2018, a new regulation (Law No. 16,802) was enacted to update these standards. Under this law, operators in São Paulo's Transport System are required to gradually reduce emissions of CO2, particulate matter (PM), and nitrogen oxides (NOx) over 20 years,[10] effectively creating a compliance pathway that prioritizes BEBs. This legal framework became the basis of the 2019 public transport tender, in which operators signed contracts committing to clean-fleet implementation schedules.

The case of São Paulo is emblematic: by defining strict emissions-reduction targets, the city created a "window of opportunity" to introduce low and zero-emission buses at scale. In practice, cities function as transition laboratories where different propulsion technologies, business models, and operational configurations can be tested in real conditions before wider scaling.

Figure 1. Stock of BEBs (except trolleybus) in Latin American countries and cities



***Source:** E-Bus Radar, November 2025[11].*

Financing innovation: business models as policy

While cities can trigger the EV transition, large-scale deployment requires multi-level coordination, innovative finance, and new business models. Santiago and Bogotá have demonstrated how to overcome the high upfront cost of BEBs by separating capital expenditure from operational expenditure. This model achieved three crucial outcomes for the Global South: i) it brought utilities and new investors into fleet-financing structures; ii) it reduced financial risk for traditional bus operators; and iii) it shifted public budgets away from direct purchasing and toward risk-mitigation and guarantee mechanisms.

São Paulo adopted a complementary approach: a partial subsidy model designed to facilitate fleet financing. Through concessional and commercial loans obtained from development banks, such as the World Bank and the Inter-American Development Bank, as well as domestic financial institutions, the city covers the price difference between a BEB and a diesel bus. This subsidy is paid directly to

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10 Cidade de São Paulo. (2018) Diário oficial Cidade de São Paulo. Lei No. 16.802 de 17 de Janeiro de 2018.
11 E-Bus Radar Platform. (2025) Electric buses in Latin America. https://ebusradar.org/en/#cities

manufacturers as a municipal disbursement, while operators retain autonomy to select their preferred national supplier based on reference prices established by the city.[12] This mechanism addresses the main barrier to fleet electrification and the high acquisition cost, and it allows a gradual yet steady shift toward zero-emission vehicles.

The lesson is clear: cities can start the transition but scaling it requires national alignment and innovative finance. Integrating municipal initiatives with national policy frameworks, and leveraging blended finance, concessional loans, and risk-sharing mechanisms, is what transforms local experimentation into a sustainable national transition pathway.

Policy Coherence: the ultimate Global South lever

Latin America's experience clearly demonstrates that the most powerful lever for accelerating electrification in the Global South is policy coherence, the strategic alignment vision, governance, and action across multiple sectors and scales.[13] Electromobility is not just a transport policy; it is also an energy policy (defining tariff structures and charging infrastructure regulation); an industrial policy (promoting local production and technological capabilities); and a fiscal policy (designing incentives and financing frameworks). When these policy spheres act in isolation, progress remains fragmented. When they align, transitions accelerate.

In Brazil's context, achieving coherence also means recognizing a mix of technological solutions for transport decarbonization. Policymakers must determine where each technology (electric, hybrid, or biofuel-based vehicles) can achieve the most efficient outcome. Electrification is critical pathway, but it should not be treated as the only viable option. Decision-makers must adopt a mixed approach, avoiding the premature prioritization of one technology over another.[14]

Public policies for electromobility should therefore be integrated with industrial policies that foster domestic EV production and charging infrastructure. Such integration would make Brazil's transition more broadly transformative, driving industrial development, business diversification, and job creation.

The most successful cases in Latin America were built on dense institutional frameworks where national strategies provided direction, and local policies deliver execution. For the Global South, the message is simple: partial policies achieve partial transitions. To break carbon lock-in, governments must combine ambitious, legally binding targets with innovative finance and seamless coordination across governance levels.

In sum, Latin America's experience shows that technology alone does not drive transitions, policy does. When targets are binding, finance is innovative, and governance is coherent, electrification accelerates even in resource-constrained contexts. For the Global South, the real leap forward will come when cities lead innovation, national governments align vision and financing, and public policy becomes the lever that moves the transition.

12 ZEBRA (Zero Emission Bus Rapid-Deployment Accelerator). (2024) "Financing e-buses in São Paulo: the partial subvention model." https://www.c40knowledgehub.org/s/article/Financing-e-buses-in-Sao-Paulo-the-partial-subvention-model?language=en_US

13 Bermúdez T, Consoni FL, Lenhari L. (2025) Policy coherence and trade-offs in the transition to battery-electric buses (BEBs) in Brazil: A multi-scalar analysis across federal, state and local levels. 16th International Sustainability Transitions Conference. Lisbon, Portugal. June 23rd-27th, 2025.

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Contributors

Tatiana Bermúdez, *Senior Researcher, CPTEn & UNICAMP Laboratory of Electric Vehicle Studies (LEVE), Brazil*

Sebastián Galarza, *Executive Director, Centro de Movilidad Sostenible, Chile*

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Global South Center
for Clean Transportation
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globalsouth.ucdavis.edu
gscenter@ucdavis.edu