E-MOVILIZA

Ecuador avanza hacia la movilidad eléctrica

Policy advice paper: regulations for light electric vehicles (LEV)

Latin American cities: focus on Quito

SOLUTIONSplus

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Executive Summary

The rise of e-mobility and new mobility services, like car-sharing and delivery platforms, has introduced new vehicle types such as micromobility and Light Electric Vehicles (LEVs). These low-speed, short-trip vehicles are ideal for urban transport and logistics, reducing energy use and GHG emissions.

While LEVs have gained attention in Europe since 2011, their specific characteristics vary. This paper proposes a definition for LEVs and explores their potential, particularly in Latin America. The SOLUTIONSplus Project funded the manufacturing and testing of 15 LEV types across Latin America, demonstrating their potential in cities like Quito and Montevideo. However, regulatory barriers remain a challenge.

This paper reviews international and local regulations, offering insights to help policymakers choose the best approach for their context. It also provides recommendations on urban infrastructure to support LEVs and promote sustainable urban mobility.

1. Introduction

Current trends in Light Electric Vehicles (LEVs) extend beyond the vehicles themselves, encompassing public space usage, new technologies, ICT, smart cities, and renewable energy. These interconnected factors require attention from national and local governments. As transport modes evolve, regulations must be updated to support sustainable urban mobility, prioritizing walking, cycling, public transport, and shared mobility. Effective regulations should guide the transition to new urban configurations, accommodating both current and future needs.

1.1.1 Advanced Vehicles

Urban transport is being transformed by innovative vehicles, including drones, robots, and micromobility options like e-bikes and scooters. Passenger transport has embraced multimodal options, integrating vehicles from e-buses to single-wheeled devices. Freight transport is also shifting, with companies like DHL adopting LEVs such as e-cargo bikes. These trends reflect the growing importance of electrified and autonomous vehicles.

Multimodal and multifunctional vehicles: multimodal and multifunctional vehicles tend to break into the market more and more, and disruptive vehicles are observed that work in combination with various modes of transport, both for people and goods.

Connected, autonomous, and electrified vehicles: this type of vehicle is also growing since its technology is more and more accessible for manufacturers and users. Electric, autonomous and cloud-connected vehicles will be one of the key pieces in the development of new modes of transport for people and goods.

Rethinking Urban Areas

Urban areas need rethinking to improve livability and address challenges in logistics and new transport modes. This requires planning changes, such as multimodal hubs and micro-hubs,

which support last-mile logistics with LEVs and shared mobility services. Infrastructure for LEVs, like Zero Emission Zones (ZEZs), Low Emission Zones (LEZs), and dedicated lanes, is essential. Concepts like superblocks and tactical urbanism aim to reclaim public spaces from cars.

Technological advancements, including smart cities, big data, and Mobility as a Service (MaaS), enhance these urban transformations. These innovations demand updated regulations for public space usage.

Multimodal and Micro-Hubs:
Multimodal hubs connect various transport modes, promoting last-mile connectivity. Micro-hubs, located in strategic urban areas, facilitate last-mile distribution with LEVs. Examples include Barcelona's repurposed parking spaces for logistics and Buenos Aires' micro-hubs for urban goods distribution.

LEVs and Infrastructure:
Essential infrastructure for LEVs includes ZEZs, LEZs, bike lanes, and traffic-calming measures. Battery swapping stations are gaining importance for quick LEV recharging.

Superblocks and Urban Concepts:
Superblocks, like those in Barcelona, prioritize people over cars, enhancing urban health and coexistence. These interventions are part of broader efforts to redefine mobility, reduce vehicular pollution, and promote sustainable transport.

Figure 15. Pedestrian area Historic Center of Quito, Ecuador. Source: SOLUTIONSplus Repository

Smart Cities and Big Data:
Smart cities use big data to optimize LEV usage and multimodal transport. Smart mobility, guided by data and geolocation, is crucial for the future of urban transport planning.

1.2 The SOLUTIONSplus Project

The SOLUTIONSplus project, funded by the EU's Horizon 2020 program, aimed to promote sustainable urban mobility through innovative electric mobility solutions. Running from January 2020 to June 2024, the project implemented pilots in 10 cities globally, supported by

a consortium of 46 partners. It included demonstrations, capacity building, business model development, and policy support, focusing on scaling and replicating e-mobility solutions.

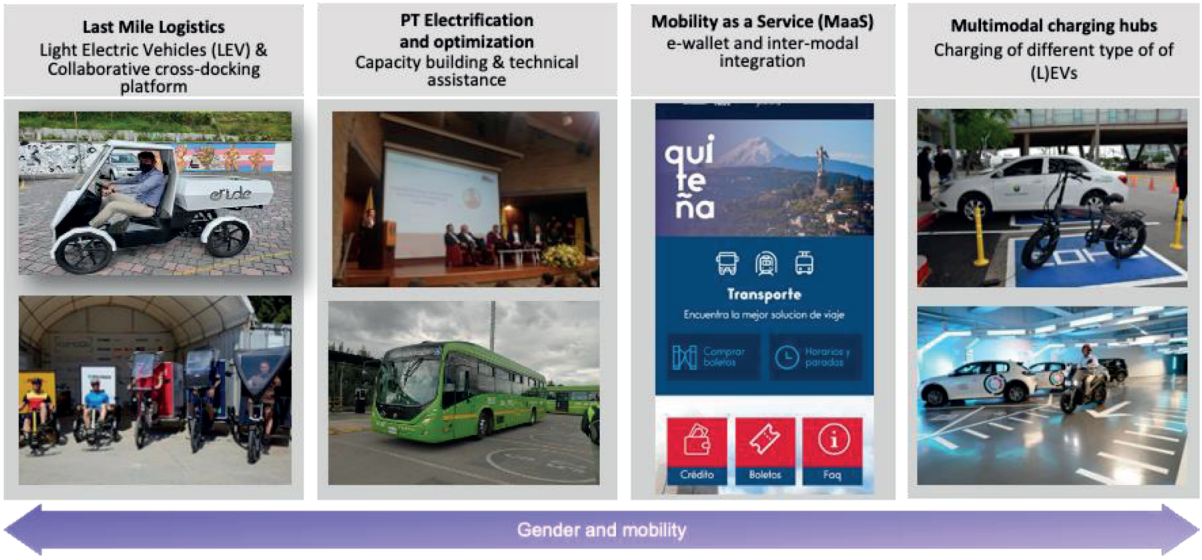

Figure 17. SOLUTIONSplus action lines in Latin America

In Latin America, SOLUTIONSplus funded the creation of 15 different LEVs, tested in logistics and passenger transport in cities like Quito and Montevideo. Despite positive outcomes, regulatory barriers were identified as challenges to broader LEV adoption.

Figure 18. LEVs funded by SOLUTIONSplus in Latin America

1.2.1 LEV Use Cases Worldwide

Beyond Latin America, the project supported LEV design and manufacturing in Asia, Africa, and Europe, with pilots covering a variety of passenger and cargo transport scenarios.

Use case	Description

Recycling associations Quito, Ecuador  *Figure 23. Pilot in Quito. Source: SOLUTIONSplus*	**Main results:** The use of e-cargo bikes allowed increase the number of packages delivered in a 100% while improving the monthly income in 25% and reducing the working hours in a 56%.
Courier services Quito, Ecuador  *Figure 24. Pilot in Quito. Source: SOLUTIONSplus*	
National Postal Services Buenos Aires, Argentina  *Figure 25. Pilot of Correo Argentino, Source: SOLUTIONSplus*	**Main results:** The e-minivans were two months in operation, delivering 6,6 packages per hour in an average travel distance of 6,5 km per hour. The load capacity increased compared to the previous vehicles used, improving the logistics operation while reducing emissions.

Barrier Analysis, Scope, and Target Groups

2.1 Barriers to LEV Adoption in Cities

Adopting light electric vehicles (LEVs) in cities faces several barriers that require targeted policies. Effective policies can lower costs and encourage local manufacturing, importation,

and use of LEVs. The focus of this paper is on national-level homologation and local policies necessary for safe urban circulation of LEVs.

Key Barriers and Policy Needs:

- **Economic/Financial:** Incentives, subsidies, and new business models (e.g., leasing, car-sharing) to reduce costs; parking benefits for LEVs; lower electricity rates.
- **Technical:** Standards for charging infrastructure and skill development programs.
- **Policy/Regulation:** Harmonized electric vehicle regulations, low-emission zones, and public procurement policies that promote LEVs.
- **Governance:** Integration of e-mobility strategies into national and local planning, with coordinated efforts across agencies.
- **Operative:** Expansion of charging infrastructure and training for transport operators.
- **Environmental:** Regulations for battery disposal and second-life usage.
- **User Engagement:** Awareness campaigns, pilot projects, and test drives to encourage adoption.
- **Infrastructure:** Development of specific lanes, public charging points, and battery-swapping stations.

Strategic Considerations:

A clear, coherent strategy between public authorities is crucial for effective LEV deployment. This includes setting long-term mobility goals, ensuring alignment across different governance levels, and fostering public-private cooperation.

2.2 Scope of the Policy Paper

This paper focuses on two key priorities identified with local counterparts in Ecuador, Colombia, Argentina, and Uruguay. It does not address all barriers to LEV adoption, such as economic incentives or urban infrastructure issues. Instead, it reviews international, national, and local guidelines, regulations, and standards from sources like the United Nations and the European Union, helping readers select the most suitable approaches for their context. It begins by proposing a definition of LEVs, drawing on English and Spanish literature, given the Latin American focus.

2.3 Policy Target Group

This paper targets stakeholders at various government levels—both local and national—who influence LEV regulations. It is also intended for private sector actors in the LEV market, including importers, manufacturers, and customs brokers. Additionally, it addresses user organizations (NGOs, trade unions) involved in urban mobility of goods or passengers.

Relevant stakeholers

Main public actors and stakeholders involved in the regulation processes for LEVs, as well as counterparts for needs, inputs and implementation of regulation, can be summarized as follows:

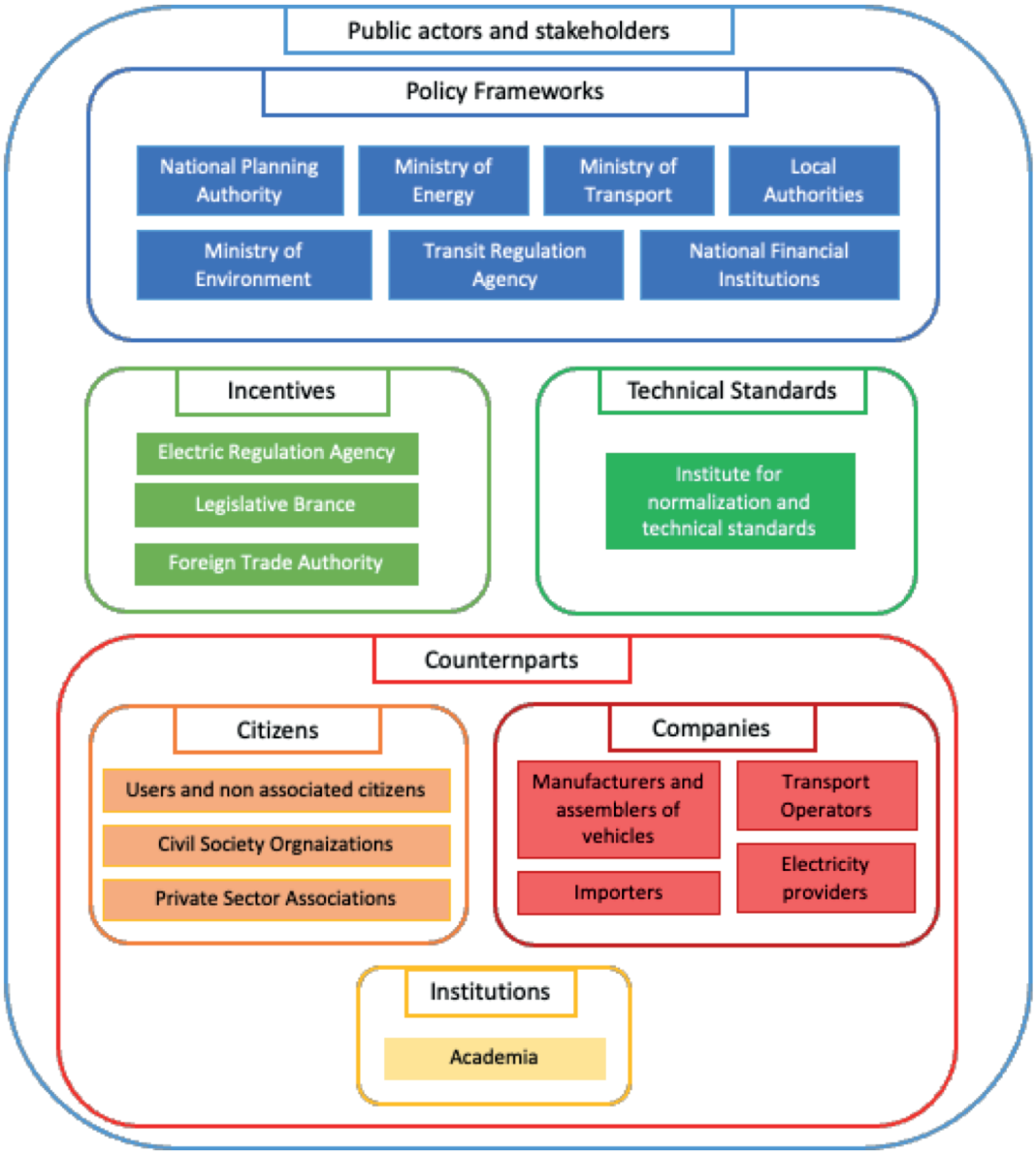

Figure 33. Stakeholders map

Definition of Light Electric Vehicle (LEV)

The rise of e-mobility and new mobility services has introduced Light Electric Vehicles (LEVs) as a vehicle type built for low speeds and short urban trips. LEVs, smaller than cars, contribute to safer, more efficient, and inclusive road use, while also reducing energy consumption and GHG emissions. Despite the growing relevance of LEVs in English literature, especially in Europe, there is no unanimous definition regarding their specific characteristics like speed, power, and weight.

For instance, the Netherlands classifies LEVs into two categories: pedal-assisted and personal LEVs with a maximum mass of 55 kg, and electrically powered vehicles up to 556 kg. In contrast, Germany's definition includes micro vehicles up to 600 kg and 90 km/h under EU regulation No 168/2013.

In Spain, LEVs are referred to as Personal Mobility Vehicles (PMVs) and categorized for personal transport or goods transport. In Latin America, terms like micromobility are more common, though electric versions of L-category vehicles are increasingly recognized in national regulations, following EU standards.

Categories of Light Electric Vehicles (LEVs)

LEVs are categorized into two main classes in this policy paper:

1. **Micromobility Vehicles**:
    - **Sub-categories**: Defined by the International Transport Forum (ITF) and European Standards, micromobility vehicles include Personal Light Electric Vehicles (PLEVs) and Electrically Pedal-assisted Cycles (EPACs).
    - **Characteristics**: These vehicles typically have 1-3 wheels, are used for personal mobility, and may be powered by muscular energy, electric motors, or a combination. They are further categorized by speed and weight:
        - **Type A & B**: Speed up to 25 km/h, weight under 35 kg.
        - **Type C & D**: Speed up to 45 km/h, heavier than 35 kg.
2. **L-category Vehicles**:
    - Based on the United Nations Economic Commission for Europe (UNECE) and EU regulations, this category includes two- and three-wheel vehicles and quadricycles. These standards are widely used globally for vehicle homologation.

Standards Overview:

- **EPACs**: European Standard EN 15194 defines requirements for power-assisted bicycles with a maximum speed of 25 km/h and power of 0.25 kW.
- **PLEVs**: European Standard EN 17128 covers light motorized vehicles for personal and goods transport, with speeds between 6-25 km/h. National regulations in countries like Spain and Germany outline specific safety and operational requirements for these vehicles.

This classification aims to guide regulation and ensure safety while promoting the adoption of LEVs in urban areas.

International Regulations and Standards for Light Electric Vehicles (LEV)

UN Standards for LEV

World Forum for Harmonization of Vehicle Regulations (Working Party 29): Under UNECE, aims to harmonize vehicle regulations globally. UN regulations are increasingly aligned with EU standards.

Key UN Regulations for L-Category Vehicles:

- **Regulation No. 136 (2023)**: Safety standards for electric powertrains and Rechargeable Electrical Energy Storage Systems (REESS).

- **UN G.T.R. No. 20 (2018)**: Safety performance standards for electrically propelled vehicles, covering high-voltage components.
- **EN 15194 (2023)**: Standards for electrically power-assisted bicycles (EPACs), focusing on safety and electrical systems.
- **EN 17128 (2020)**: Safety standards for personal light electric vehicles (PLEVs), including those with self-balancing systems.
- **ISO 13063 (2022)**: Safety specifications for electrically propelled mopeds and motorcycles.

LEV Homologation

European Regulation No. 168/2013: Governs the approval of light electric vehicles (L1e to L7e categories). It covers administrative and technical requirements but does not apply to individual vehicle approvals or certain vehicle types (e.g., those with a maximum speed under 6 km/h, competition vehicles).

Key Homologation Requirements:

1. **Verification**: Approval authorities must ensure conformity through checks and tests at manufacturing sites.
2. **Environmental and Performance**: Vehicles must meet emissions, sound, and efficiency standards.
3. **Functional Safety**: Requirements include braking systems, electrical safety, visibility, and protective features.
4. **Construction and Approval**: Includes anti-tampering measures, electromagnetic compatibility, and general vehicle construction standards.
5. **Technical Services**: Must conduct designated tests and assessments to ensure compliance with regulations.
6. **Administrative Procedures**: Involves preparing technical documentation, obtaining Certificates of Conformity, and World Manufacturer Identifiers.

Local Regulations and Policies for Light Electric Vehicles (LEV)

The rise of digitalization, electrification, and Mobility as a Service (MaaS) is transforming urban mobility, including the use of light electric vehicles (LEVs). For these innovations to contribute effectively to sustainable urban transport, local regulatory frameworks need to be adaptable and comprehensive.

Key Aspects of Local LEV Regulations:

- **Safety Requirements**: Regulations should ensure user safety, including helmet use, reflective gear, and age limits.
- **Road Use**: Defines where LEVs can travel, such as bike lanes versus high-speed roads.
- **Parking**: Designates areas for LEV parking.
- **Licensing**: Covers vehicle registration, driver licensing, and permissions for carrying passengers or goods.

Regulatory Considerations:

- **Agility**: Regulations must adapt swiftly to technological advancements.
- **Local Adaptation**: Regulations should fit the specific needs of different regions.
- **Innovation**: Frameworks should encourage innovation while managing risks.
- **Evidence-Based**: Regulations should be supported by data demonstrating societal, environmental, and economic benefits.
- **Multi-Modality**: Supports integration with other transport modes.

As LEVs evolve, local governments must update their regulations to address new challenges and ensure safe, efficient, and orderly urban mobility. This includes setting speed limits, defining vehicle types for different roadways, and ensuring safety measures are in place for users.

Local Regulations and Policies for LEVs

Local regulations for LEVs should address:

- Vehicle type definitions
- Circulation and parking rules
- Specific requirements
- Permitted uses
- Public space usage

New LEV types necessitate updates in urban planning and infrastructure to support sustainable city mobility, especially for first and last-mile connectivity.

LEV Definition

Regulating LEVs begins with clear definitions. Latin American regulations often focus on PLEVs, overlooking other LEV categories like micro-vehicles and larger L-category vehicles. Comprehensive definitions should include all LEV types, considering speed, size, and load capacity.

Circulation and Parking Rules

Current Latin American regulations permit micro-vehicles on bike lanes at up to 25 km/h, but lack infrastructure for higher-speed LEVs, risking safety. Recommended rules are:

- Micromobility vehicles can use bike lanes at up to 25 km/h.
- L-category vehicles should use roads with a speed limit of 50 km/h or less.
- All LEVs are allowed on streets with a 30 km/h speed limit.
- LEVs must not be ridden on sidewalks but may walk them if needed.
- LEVs should be parked in designated public spaces to avoid congestion.

Requirements for LEV Users

Requirements vary by LEV type but generally include:

- Micromobility vehicles must have bells, lights, and reflectors.
- Users must be at least 15 years old.

- Helmet use is recommended but not mandatory, except for minors, mixed traffic, and goods delivery.
- Headphones are banned, and riding under the influence is prohibited.
- A driving license may be required for L-category vehicles.

Commercial Uses of LEVs

LEVs may be used commercially for:

- Passenger transport (e.g., bicitaxis)
- Last-mile logistics
- Shared mobility
- Tourism

Commercial LEVs may require:

- Helmets
- Liability insurance
- Vehicle registration and inspection

Urban Planning and Infrastructure for LEVs

As LEVs become more common, urban infrastructure needs updating. This includes:

- Reorganizing space previously used by cars for public transport and PMVs.
- Designing sidewalks and bike lanes to accommodate increased traffic.
- Establishing designated parking and charging spaces.
- Developing multimodal hubs to connect LEVs with public transport.

Road Infrastructure

New infrastructure, such as "slow" or "light" lanes, should be considered for safe LEV circulation. NACTO's guide and examples from Madrid highlight the need for these adaptations.

Multimodal Hubs/Mobility Stations

These hubs aim to:

1. Manage public space usage
2. Provide charging infrastructure
3. Enhance integration with public transport

Key considerations include:

- Strategic locations
- Combined parking and charging facilities
- Ergonomic and safety features

- Maintenance and security measures
- Scalable designs
- Mobile apps for real-time management

Conclusions

1. National and local policies are crucial for the safe and effective adoption of light electric vehicles (LEVs) in Latin America. A strong regulatory framework can lower costs, boost local manufacturing, and facilitate LEV use.
2. International standards, like the European Regulation No. 168/2013, can guide LEV homologation in Latin America, which is key to integrating LEVs into urban mobility systems and recognizing their sustainability benefits.
3. Municipal regulations must ensure LEVs circulate safely without compromising other road users' safety. This involves adjusting road space and infrastructure to accommodate LEVs and promote sustainable urban mobility.
4. Examples from cities like Madrid and Berlin show the value of multimodal lanes and dedicated mobility stations, which should be widely adopted in urban planning.
5. Effective LEV promotion requires not only regulations but also supportive policies, measures, and incentives to fully realize their potential.