United Nations Development Programme

Low-emission transport

to achieve the Paris Agreement in Latin America and the Caribbean

Progress and recommendations

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Abbreviations

ASOMOVE	*Asociación Costarricense de Movilidad Eléctrica* (Costa Rican Electric Mobility Association)
BA	Buenos Aires
BAU	Business As Usual
BEB	Battery Electric Buses
BEV	Battery Electric Vehicle
BRT	Bus Rapid Transit
BTR	Biennial Transparency Report
CAF	*Corporación Andina de Fomento* (Andean Development Corporation)
CDMX	Mexico City
CH4	Methane
CO_{2eq}	Carbon dioxide equivalent
CO2	Carbon dioxide
COP	Colombian peso
DM	Demand Management
ENME	*Estrategia Nacional de Movilidad Eléctrica* (National Electric Mobility Strategy)
EU	European Union
EV	Electric Vehicle
GDP	Gross Domestic Product
GESI	Gender Equality and Social Inclusion
Gg	Gigagram
GHG	Greenhouse Gases
GIZ	*Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH* (German Agency for International Cooperation)
Gt	Gigaton
HEV	Hybrid Electric Vehicle
ICAO	International Civil Aviation Organization
ICEV	Internal Combustion Engine Vehicle

IDB	Inter-American Development Bank
IEA	International Energy Agency
IMO	International Maritime Organization
IP	producer's income (*Ingreso al Productor*)
IPCC	Intergovernmental Panel on Climate Change
Kg	Kilogram
Km	Kilometre
kWh	Kilowatt-hour
LAC	Latin America and the Caribbean
LTS	Long-Term Strategy
MA	Ministry of Environment (*Ministerio de Ambiente*, Uruguay)
MEF	Ministry of Economy and Finance (*Ministerio de Economía y Finanzas*)
MIEM	Ministry of Industry, Energy and Mining (*Ministerio de Industria, Energía y Minería*, Uruguay)
MRV	Measurement, reporting and verification
Mt	Megatonne
MTOP	Ministry of Transport and Public Works (*Ministerio de Transporte y Obras Públicas*, Uruguay)
N2O	Nitrous oxide
NAFIN	*Nacional Financiera* (Mexico)
NAMA	Nationally Appropriate Mitigation Action
NDC	Nationally Determined Contribution.
NGV	Natural Gas Vehicles
NREL	National Renewable Energy Laboratory
OECD	Organisation for Economic Co-operation and Development
OLADE	Latin American Energy Organization
PAYS	Pay As You Save
PHEV or PHEB	Plug-in hybrid electric vehicles or plug-in hybrid electric buses
PMME	*Plan Maestro de Movilidad Eléctrica para el Transporte Público Urbano y Logístico* (Electric Mobility Master Plan for Urban Public Transport and Logistics, Paraguay)
PNCC	*Política Nacional de Cambio Climático* (National Climate Change Policy)
POT	*Plan de Ordenamiento Territorial* (Land use Plan)
RUNT	*Registro Único Nacional de Tránsito de Colombia* (Colombian National Traffic Registry)

SieLAC	*Sistema de Información Energética de Latinoamérica y el Caribe* (Energy Information System for Latin America and the Caribbean)
SITP	*Sistema Integrado de Transporte Público* (Integrated Public Transport System)
STPS	*Secretaría del Trabajo y Previsión Social* (Secretariat of Labour and Social Security, Mexico)
TCO	Total Cost of Ownership
TOD	Transit-Oriented Development
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
US$	US dollars
UTE	State-owned electricity company (Uruguay)
VAT	Value Added Tax

Definitions

Articulated bus: This is a public transport vehicle with two wagons linked by an articulated joint. These buses can be 18 or 20 metres long and carry up to 160 or 190 passengers respectively.

B-train or B-double: A combined freight vehicle, consisting of a truck towing two trailers that are connected to it with a B coupling (a fifth wheel).

BAU: Refers to a 'business-as-usual' scenario, in which no significant changes are made.

BEV: Refers to a battery electric vehicle, which obtains its energy from a rechargeable battery, with no need for an internal combustion engine.

BEV: Battery electric vehicles are cars that run exclusively on electricity.

Bi-articulated bus: These public transport vehicles have three wagons and two articulated joints, giving them a length of 27.2 metres. They can accommodate up to 242 passengers and weigh 40 tonnes.

CO2eq: Carbon dioxide equivalent is a metric measure corresponding to a carbon footprint in tonnes.

Enel X: A company providing energy supply and management services.

Euro: A set of European Union standards that establishes emissions limits for motor vehicles in relation to air pollutants and GHG emissions.

First or last mile: Refers to trips made at the beginning or end of a multimodal trip to reach the destination or connect to a mass transit system.

HEV: Hybrid electric vehicles combine two propulsion systems: an internal combustion engine (ICE) and an electric motor.

Hybrid vehicles: These have an internal combustion engine powered by fossil fuels and an electric motor powered by batteries. There are various categories: mild hybrid electric vehicles (MHEVs), full hybrid electric vehicles (FHEVs) and plug-in hybrid electric vehicles (PHEVs).

ICEV: In an internal combustion engine vehicle, the engine burns fossil fuels to produce the mechanical energy that powers the vehicle.

Informal mode: A transport system that serves the public but is unregulated and formally recognized. While it can provide mobility options in underserved areas, it also raises concerns about user safety and unfair competition with regulated public transport.

LTS: Long-Term Strategy or low-emissions development strategy. This term refers to long-term climate strategies, with a horizon of 2050 or beyond, formulated and submitted as documents by countries.

Means of transport: This covers the vehicle or action used to move people or goods from one point to another. The categories used in this document are: bus, train, subway, cable, car, motorbike, taxi, pedestrian and bicycle.

MFV: Modular freight vehicles are combination vehicles used to transport freight. They are also known as non-conventional trucks or high-capacity vehicles and consist of a tractor unit and two or more semi-trailers, thus offering greater freight capacity and consequently greater efficiencies.

Mode of transport: The way in which people and goods move around, differentiated by the type of infrastructure and technology used. This includes road, rail and intermodal logistics.

MRV: Measurement, reporting and verification refers to a set of processes and procedures used to monitor and document GHG emissions and other activities related to climate change.

Nationally Appropriate Mitigation Action (NAMA) Facility: A financial and technical initiative created to support developing countries in implementing climate change mitigation actions. It provides funding and advice for projects that reduce GHG emissions in key sectors.

NDC: Nationally Determined Contribution refers to the commitments made voluntarily by each country to reduce national greenhouse gas emissions and adapt to the effects of climate change within the framework of the objectives of the Paris Agreement.

PAYS: Pay As You Save is a financial model where energy infrastructure is improved with no upfront payment; instead, the improvements are paid for with the savings generated on the energy bill.

PM10: Airborne particulate matter with an aerodynamic diameter equal to or less than 10 micrometres. These particles are a type of air pollutant and can include dust, ash, soot, metal particles and other solid or liquid substances.

Sector: NDCs are classified according to the economic sector they relate to: energy, transport or cross-cutting. These sectors are used to group and classify the specific commitments and actions that a country undertakes to address climate change and reduce GHG emissions.

Standard bus (*bus padrón*): A type of bus used in public transport systems. It has a single wagon, is 12 metres long, and has medium capacity, carrying up to 80 passengers. It serves high-demand urban and interurban routes.

Subcategory: The categories of transport supply presented in the NDCs. Each subcategory covers a specific component or aspect, such as public transport, light vehicles, freight, non-motorized and fuels/energy.

Sustainable mode of transport: A category covering efficient means of transport with minimal environmental and social impact, low or zero GHG emissions. They contribute to climate change mitigation and, therefore, to better quality of life for people.

Foreword

The first global stocktake of the Paris Agreement revealed that parties were not on track to meet the proposed targets. It showed that if all the plans in current Nationally Determined Contributions (NDCs) were fully implemented, it would achieve only a 2.6 percent reduction in emissions by 2030 compared to 2019. This is clearly insufficient, given that an annual reduction of 7.6 percent between 2020 and 2030 is required to limit global warming to 1.5°C above pre-industrial levels.

The first global stocktake highlighted the need to accelerate the reduction of emissions from road transport, among other actions. It emphasized that parties must "accelerate the reduction of emissions from road transport on a range of pathways, including through the development of infrastructure and rapid deployment of zero- and low-emission vehicles" as one of eight priority actions.

To accelerate a response to this call to action in the transport sector in LAC, some groundwork was needed. This study set out to first understand the progress made in the region against the commitments set out in the NDCs. The transport sector has become one of the biggest sources of greenhouse gas (GHG) emissions in the region, accounting for an average of 39 percent of the emissions produced by the energy sector. In many countries, the energy mix is based on renewable energy. As this trend grows, transport accounts for an increasing share of emissions in national GHG inventories. For example, in Costa Rica, transport accounts for 42 percent of the total emissions inventory, while in Ecuador transport generates 49 percent of the GHG emissions produced by the energy sector.

The region is also highly urbanized, with 81 percent of its inhabitants living in large cities. This


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distribution has consequences for transport: Between 2007 and 2014, the region recorded an increase in the car fleet of 142.8 percent and 253.1 percent in the total number of motorbikes. This situation adds to the complexity of potential solutions.

This document presents a synthesized analysis of the current progress towards NDC targets of the 20 LAC countries whose proposed climate actions included targets on transport. The study seeks to understand the progress made on these actions in terms of actual implementation on the ground.

An important finding highlighted in this report is that public and light transport is a priority in the NDCs of LAC countries: 18 of the 20 countries analysed establish specific lines of action, and almost all of them prioritize the technological modernization of the public transport and light vehicle fleets.

However, despite countries' clear intentions to move towards electric propulsion technologies in public transport, they have made little progress on implementing the actions proposed in their NDCs. In particular, the study found that countries had not taken the necessary measures to improve the quality and coverage of the technological ecosystem, and had not carried out an analysis of the social implications that would enable them to develop an enabling framework and catalyse a more efficient shift towards more sustainable transport options.

The report also shows that only 6 of the 20 countries have prioritized the freight transport sector, suggesting that there is a significant opportunity to achieve emissions reductions in this sector. It notes that it will be important to include stronger actions in future NDCs for this sector, including strategies for the renewal of vehicle fleets and for promoting intermodality.

Sustainable urban planning is also not sufficiently addressed in the NDCs of the countries analysed, despite its high potential for reducing GHG emissions. The report concludes that transport-oriented urban planning (known as transit-oriented development, TOD) has significant potential to generate co-benefits in terms of quality of life, health and the social good.

The analysis also highlights that the priorities set out in the NDCs on low-emission transport do not always consider the full life cycle of the proposed technology and its multiple implications. Decisions on which new technologies to prioritize should be informed by analysis of the following variables for each of the proposed technological models: the proportion of renewables versus fossil fuels in the energy mix, supply chains, social impact, effects on mining, waste generation and final disposal.

We, the report's authors, hope this document will allow the main stakeholders to identify the best ways to propose solutions that draw on an updated regional perspective. We also hope to contribute to achieving proposals at scale that will bring countries closer to meeting the objectives of the Paris Agreement in the next five years (by 2030), through a better understanding of the barriers they face for this sector in the region.

Lyes Ferroukhi
UNDP Regional Team Leader of the Environment and Energy Team for Latin America and the Caribbean

Executive summary

The transport sector is one of the main contributors to GHG emissions worldwide, and therefore offers opportunities for developing well-defined, high-impact solutions that will help countries achieve their proposed NDC targets. In Latin America and the Caribbean, the transport sector is the biggest generator of CO2 from combustion, accounting for 37.7 percent of the total, followed by the industrial sector at 28.2 percent and the residential sector at 13.6 percent.

According to the International Energy Agency (IEA), 91 percent of the world's transport energy still comes from fossil fuels [1]. Latin America and the Caribbean (LAC) contributes to this trend, with 97 percent of transport sector demand met by fossil fuels in 2022. The remainder comes from other primary sources, including biofuels. There is, therefore, a major opportunity to advance the energy transition within the transport sector.

The purpose of this study is to take stock of the progress made in the transport sectors of 20 LAC countries towards meeting their NDCs.[1] For this purpose, the NDCs have been placed into four main categories: transport supply, demand management, urban planning, and gender equality and social inclusion. In turn, the transport supply NDCs have been placed into four sub-categories, according to the mode of transport: public transport, freight transport, light vehicles (private transport) and non-motorized transport. The main considerations and conclusions of the study for the 20 countries analysed are presented below.

The NDCs of the 20 countries vary in level of detail. El Salvador, Honduras and Trinidad and Tobago have set general goals without detailing specific actions. Argentina, Barbados, Belize, Bolivia, Dominica, Ecuador, Mexico, Paraguay and the Republic of Haiti

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1 Antigua and Barbuda, Argentina, Barbados, Belize, Bolivia, Chile, Colombia, Costa Rica, Dominica, the Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Mexico, Panama, Paraguay, Trinidad and Tobago, and Uruguay.

have proposed concrete strategies, but have not given specific figures. Meanwhile, Chile and Panama include strategies with quantitatively modelled measures, but have not made these binding commitments. Only Antigua and Barbuda, Colombia, Costa Rica, Dominican Republic, Guatemala and Uruguay have proposed specific, binding and quantifiable strategies.

Public transport is a priority in the LAC NDCs, with 18 of the 20 countries analysed making commitments in this regard. These relate in particular to electric buses and, in some cases, the transition to natural gas vehicles or, at a later stage, Euro 5 technologies. Fourteen countries have NDCs that fall into the light vehicles sub-category; these focus on the electrification of cars, motorbikes and taxis. Only 10 countries have targets in their NDCs that relate to freight transport. Of those countries, nine include targets focused on road transport and only five address intermodal transport. Their strategies include renewing their fleets of heavy goods vehicles, adopting green hydrogen technologies, improving energy efficiency and electrifying light commercial vehicles in urban areas. Nine countries have activities related to non-motorized transport, mainly involving promoting bicycle use. One of the study's findings is that there are significant opportunities for LAC countries to expand their ambition by integrating active mobility into their NDCs.

Only 25 percent of the countries analysed have objectives related to demand management (specifically, to traffic and parking management, and remote working) and just 3 of the 20 countries have objectives related to urban planning (transit-oriented development, TOD) in their NDCs. LAC countries appear to be lagging behind in their commitments to increase the number of new transport projects and promote a voluntary modal shift, reducing the need to travel and shortening travel distances. In terms of gender equality and social inclusion, 19 of the 20 countries include cross-cutting actions to guide the development of initiatives in the four mode-based sub-categories, so that women and vulnerable communities also benefit from the energy transition in

LAC and the shift to low-emission transport. In some cases, the proposed actions make explicit reference to segments of the population such as minorities, persons with disabilities, children and older adults.

In general, the LAC countries are at very different stages in terms of their progress with implementing the actions set out in their NDCs. Chile, Colombia and Mexico show significant progress in the categories of public transport, light vehicles, freight vehicles and non-motorized transport, while Uruguay shows progress in the first three of those categories. (This study will look in more depth at these four countries via a case study.) Costa Rica, the Dominican Republic, El Salvador, Guatemala and Panama have made progress in at least two of the transport mode categories, for which they have projects already partially operating or at implementation stage. Ecuador has some fully operational public transport projects and Barbados has one that is partially operational. Argentina and Paraguay are in the process of implementing and structuring initiatives. However, Antigua and Barbuda, Belize, Bolivia, Dominica, Haiti, Honduras and Trinidad and Tobago are only at the planning stage.

Limited progress has been made in electrifying public transport; the progress achieved is concentrated mainly in Chile, Colombia and Mexico, which account for 68 percent of the electric fleet in operation in the region. However, in these countries, electric buses account for between just 4 and 13 percent of the operational fleets in the major cities. Uruguay and Guatemala, meanwhile, have made significant progress in their plans through innovative financing and subsidy schemes. Other countries such as Belize, Costa Rica, Paraguay and Trinidad and Tobago have technical pilots in the initial stages. In addition, several countries are developing regulatory frameworks and tax incentives, but have not yet produced any material results.

In LAC, countries are making slow progress in the transition to low-emissions freight transport. Chile and Uruguay have implemented energy efficiency schemes and pilot programmes for the electrification of urban logistics. Colombia has upgraded 28,000 heavy goods vehicles to Euro 6 standards. Argentina is working to renew its fleet through a shift to natural gas vehicles. Across the countries studied, biofuels have not yet been widely adopted and green hydrogen is still in its infancy. In intermodal transport, Mexico shows

the greatest progress in railway construction, while Colombia and Costa Rica have carried out studies to optimize intermodal logistics.

In LAC, electric cars have limited market share, with a penetration rate of less than 1 percent. Their adoption has been constrained by high acquisition costs and the lack of vehicle charging infrastructure. In addition, the positive impact of electrification on emissions reduction is limited by vehicle congestion and fossil fuel-based energy mixes.

In terms of non-motorized transport, Bogota, Buenos Aires, Medellin, Mexico City and Santiago have the most public bicycle systems and bike path networks. El Salvador and the Dominican Republic have created some cycle lane circuits. However, other countries in the region do not prioritize non-motorized transport in their NDCs.

This study offers a set of recommendations on how to accelerate the mitigation of GHG emissions and help develop a comprehensive approach to the transport sector in the NDCs of LAC countries. One key recommendation is that, for the transport sector, NDCs have a balance between activities related to demand management, urban planning and transport supply. These activities would include encouraging the use of public transport, non-motorized transport and practices such as remote working, along with discouraging the use of private vehicles to reduce urban congestion and its economic costs. The study also recommends the TOD methodology, which promotes urban development around the public transport network stations to create compact and sustainable cities.

Across LAC, several pioneering cities offer models in terms of progress towards low-emission public transport. They offer valuable lessons for other countries for the best strategy for the transition to low-emission transport. The way forward for this transition depends on the composition of the energy mix in each country, battery costs and the availability of other low-emission technology options. For example, for a country that wants to mitigate congestion but

has an energy mix based on fossil fuels and limited access to inputs such as lithium and cobalt, the best solution could be to prioritize the transition to low-emission public transport over the electrification of the private transport fleet. Pilot experiences are crucial to evaluating the feasibility of new technologies. A regional commitment is needed to collect and share results from these pilots, to help countries make informed decisions when comparing technologies and determining what is most appropriate for each urban context.

Likewise, it is essential to expand the charging infrastructure and authorize net-billing schemes[2] to improve efficiency and reduce network costs. Standardization is also needed to assist with the import and deployment of electric vehicles. In addition, proper management of battery recycling and disposal through circular economy schemes is crucial to minimizing environmental impact.

The high cost of low-emission vehicles makes it crucial to develop sustainable business models, seek international cooperation, redirect fuel subsidies and establish support funds. Countries need to implement robust financial structuring systems to support the acquisition and operation of these vehicles, based on innovative models such as operational leasing, green bonds and fleet-as-a-service models, with the participation of different public and private sector players. Moreover, incentives like tax exemptions or reductions for the acquisition and operation of low-emission fleets will be essential to increase their share of the total transport supply.

Enhancing river, rail and intermodal freight transport will improve efficiency and reduce emissions. Implementing satellite monitoring systems and digital logistics coordination platforms will reduce operating costs and environmental impacts. Specific financial incentives for companies and small business owners, together with business formalization, will improve access to financing that will enable the cargo fleet to be renewed. Green hydrogen has great potential, but mass adoption is several years away, due to the high costs of acquiring hydrogen-powered trucks.

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2 System for the auto-generation of energy based on non-conventional renewable energies. See: Distributed Generation - NetBilling - CGE.

Introduction

Introduction

By mid-2023, 176 countries, representing 80.5 percent of global emissions, had submitted a new or updated Nationally Determined Contribution (NDC) A key priority for UNDP is to continue to support countries to accelerate the implementation of climate actions in line with the priorities of the Paris Agreement and their NDCs. As 2023 was the year of the first global stocktake of the Paris Agreement's implementation, UNDP wanted to explore progress towards objectives in one of the highest-emitting sectors in the region: transport.

UNDP has carried out a regional analysis of progress in actions to reduce greenhouse gas (GHG) emissions in the transport sector. The objective of this study is to inventory the implementation of low-emission transport initiatives within the framework of the NDCs and the long-term strategies (LTSs) of 20 countries in Latin America and the Caribbean. This work will make it possible to evaluate progress and results in terms of the policies, strategies and projects put in place. To draw up this inventory, the following was necessary:

- analysing the updated NDCs and LTSs of the countries in the region that had set targets related to the transport sector in order to meet the goals of the Paris Agreement;
- assessing progress made on actions specified in the NDCs and LTSs;
- identifying best practices that assist with planning, adoption and implementation of actions defined in the NDCs and LTSs in countries of the region, using outstanding examples as a reference;
- examining the main barriers that have hindered progress towards low-emission mobility in LAC, and extracting lessons learned to overcome these barriers; and
- proposing recommendations and guidelines to encourage the effective implementation of commitments that promote low-emission transport, thus contributing to climate change adaptation and mitigation.

The geographical scope of the study covers 20 LAC countries. These are the 20 countries that have set targets related to low-emission transport in their updated NDCs and/or LTSs. The 20 countries for which analysis and findings are presented in this study are the following: Antigua and Barbuda, Argentina, Barbados, Belize, Bolivia, Chile, Colombia, Costa Rica, Dominica, the Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Mexico, Panama, Paraguay, Trinidad and Tobago, and Uruguay. Brazil is the biggest generator of emissions in the region, with the transport sector accounting for 47 percent of the national total [2] However, Brazil was not included in the study because it makes no specific commitments related to transport in its NDC. Nonetheless, it does have significant emissions mitigation initiatives.[3] This study aims to show the importance of NDCs as a recent tool that integrates climate and sustainability policies.

Figure 1. Geographical scope of the study

Source: Authors' own work

3 One example is the RenovaBio programme, which has driven an increase in the production of biofuels in the country and, as a result, 25 percent of the energy consumed in the transport sector comes from these fuels [267].

This study conducted an in-depth analysis of four countries that stand out for their good practices in relation to implementing measures for various transport modes. These are Chile, Colombia, Mexico and Uruguay. The first three have become regional benchmarks in the areas of public transport and the shift to low-emission fleets, while Uruguay leads the way in the efficient allocation of subsidies for public transport. These countries were selected on the basis of several criteria, listed below:

- The characteristics of each country's socioeconomic, productive and operational activities, such as its status as an oil producer or importer and/or the presence or absence of fossil fuel subsidies.
- The actions they had set for themselves, together with significant progress in their corresponding NDCs and LTSs, and broad range of actions and innovative criteria in the transition to low-emission transport.
- Their objectives included actions aimed at promoting gender equality and social inclusion in the transport sector, so that this component could be considered in the analysis.

This report is divided into five chapters that address the current situation of transport in the region, analyse the transport measures proposed in the NDCs and LTSs, and assess the implementation status of these measures. Finally, they provide recommendations and conclusions.

1 Current situation of the transport sector in Latin America and the Caribbean

1. Current situation of the transport sector in Latin America and the Caribbean

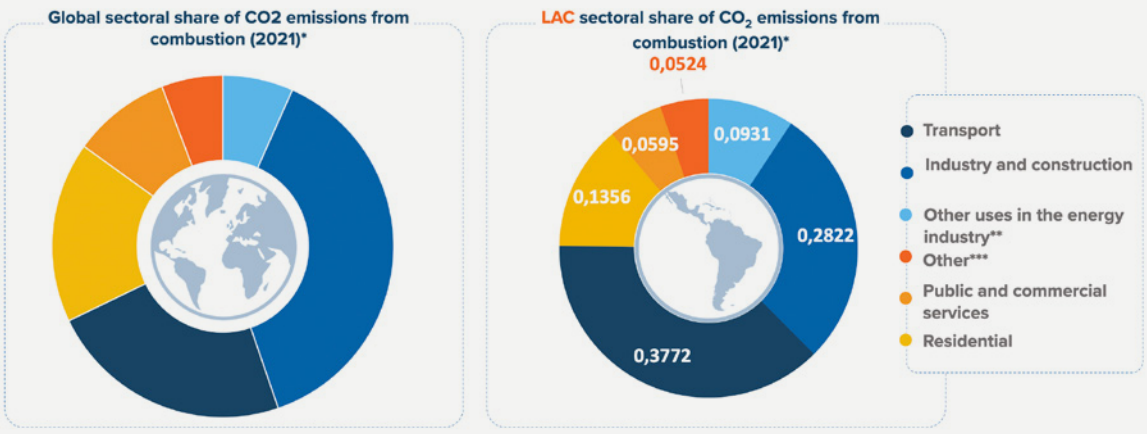
Section 1.1 of this chapter describes the transport sector's contribution to GHG emissions in LAC, the energy mix of the sector and provides a background on combustion emissions. Section 1.2 details the emissions generated by different modes of transport and presents the opportunities identified for improvement.

1.1. The transport sector's contribution to GHG emissions

In 2021, the energy sector was the largest emitter of GHGs globally, contributing 73.2 percent of total emissions, equivalent to 37.1 $GtCO_2eq$. The next largest emitters were agriculture, forestry and land use (18.4 percent); industry (5.2 percent); and waste (3.2 percent). In the LAC region in 2021, 3.7 $GtCO_2eq$ was emitted. Here too, the energy sector was the largest emitter, accounting for 47 percent. It was followed by agriculture, forestry and other land use at 27 percent; industry at 12 percent; waste at 8 percent; and other sectors at 6 percent [3].

In 2021, 92 percent of the GHG emissions produced by the energy sector globally were generated by combustion processes (equivalent to 67 percent of all emissions). **In LAC, within the specific category of GHG emissions from combustion, the transport sector is found to be the main generator of CO_2, contributing 38 percent, followed by industry at 28 percent and households at 14 percent.** The transport sector's share of emissions is bigger in LAC than in any other region of the world. Globally, industry and the construction sector accounts for 38 percent of total CO_2 emissions, while transport is the second-biggest emitter, at 23 percent. Figure 2 shows total GHG emissions from combustion by sector at global level and in LAC.

Figure 2. Share of total GHG emissions worldwide and in LAC by sector

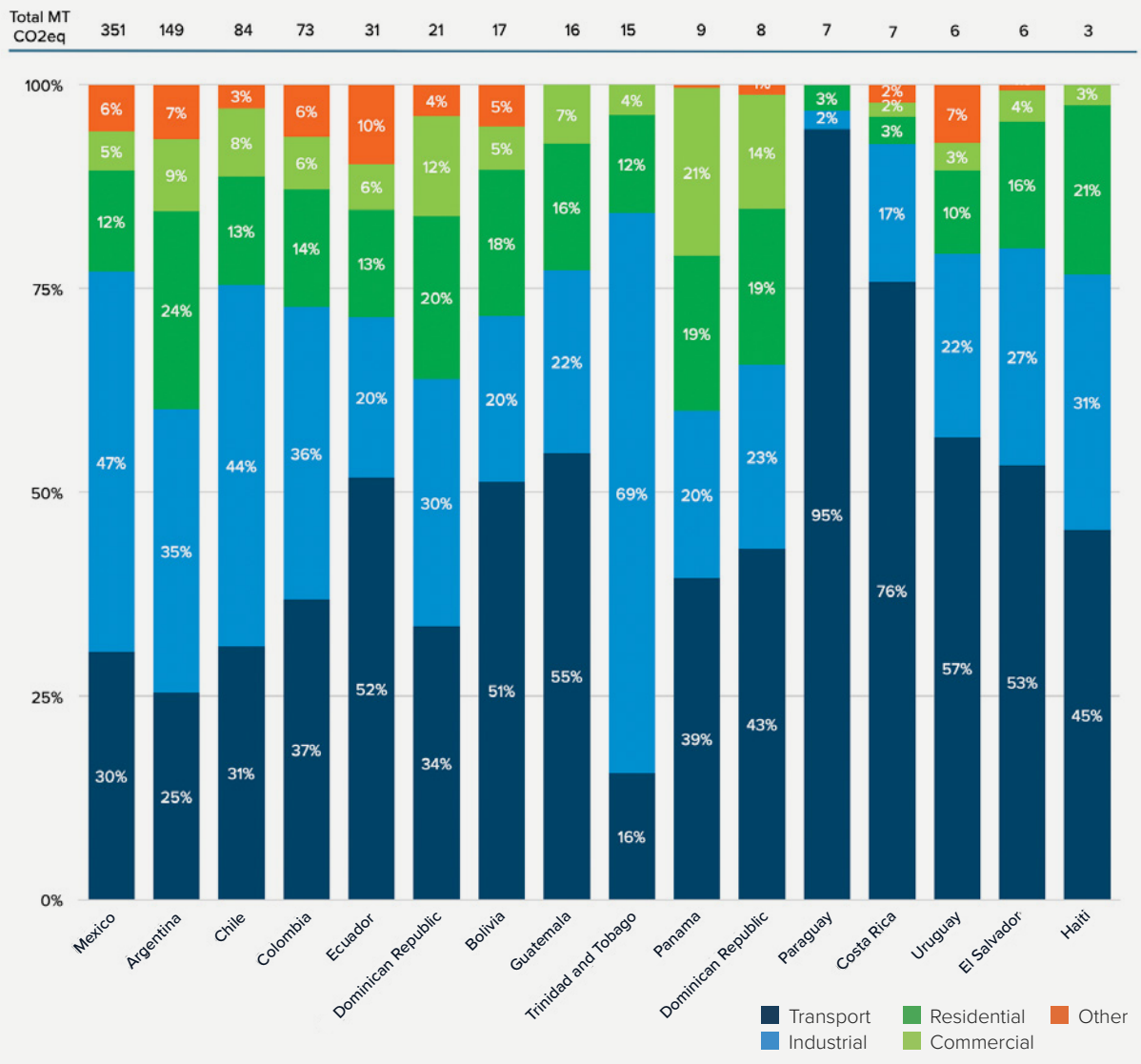


* Sectoral breakdown of CO2 emissions from combustion includes emissions from heat and power generation in each sector.
** Emissions from own use in petroleum refining, solid fuels manufacturing, coal mining, oil and gas extraction, and other energy generating industries are included.
*** The category "other" refers to emissions from agriculture and forestry, fisheries, own energy use by industry, and other final consumption not elsewhere specified.
Source: IEA 2021 [2].

The transport sector makes such a significant contribution to GHG emissions in LAC because it is the region's biggest consumer of energy and is mainly dependent on oil. In fact, 97.2 percent of transport sector's energy demand was met by fossil fuels [4]. In addition, **industry and households in LAC use mainly electricity and natural gas, which reduces their share of GHG emissions.** In the 2021 regional aggregate, the electricity production mix shows that 42.8 percent came from hydro, 38.7 percent from non-renewable thermal, 7.7 percent from wind, 4.5 percent from renewable thermal, 3.4 percent from solar, 2.2 percent from nuclear and 0.7 percent from other sources [4]. Therefore, in the regional aggregate, electricity is mainly generated from clean sources.

GHG emissions vary by country and economic sector. Brazil, Mexico and Argentina are the largest emitters of CO_2 in LAC, accounting for 66 percent of the total. In Brazil, the transport sector is the biggest emitter. In Mexico it is industry, while in Argentina transport, industry and households are tied. Figure 3 shows the distribution of emissions by sector for various LAC countries, revealing that in many cases the transport sector is the largest contributor.

Figure 3. GHG emissions by country ($MtCO_{2eq}$) and distribution by sector



Note: Includes emissions from heat and power generation relocalized by sector.
Source: IEA 2020 [2].

1.2. Transport modes and emissions

This study classifies NDCs that include activities focused on transport supply into four categories, according to mode:

- **public transport** (bus, subway, train and cable car);
- **light vehicles** (car, motorbike and taxi);
- **freight transport** (heavy road vehicles, light road vehicles, train, inland waterway vessels and intermodal transport), and;
- **non-motorized transport** (pedestrian and bicycle).

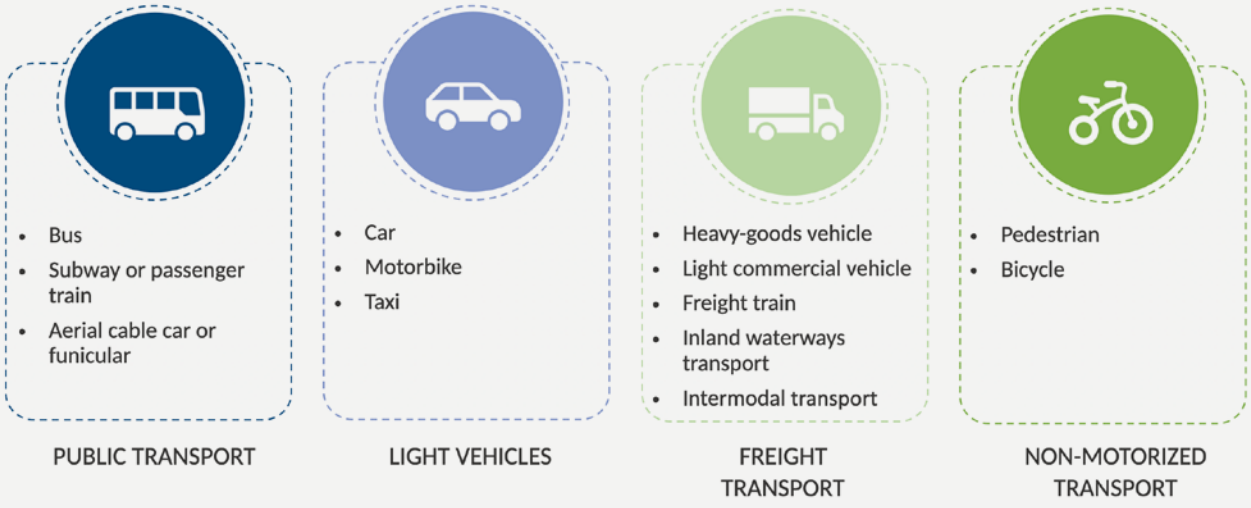
The study also notes the contribution to GHG emissions of domestic demand for air and maritime travel, but does not consider international shipping or aviation. This is in line with the approach used in national GHG emissions inventories. Figure 4 presents the modes of transport analysed in this study.

GHG emissions in the transport sector in LAC are mainly generated by land transport, with a smaller contribution from rail and river transport. In Chile, Colombia, Costa Rica and Uruguay, land transport accounts for more than 75 percent of total emissions in the sector, according to each country's national inventory.

Freight movement contributes significantly to transport sector emissions in LAC. For example, in Colombia, heavy trucks, buses and light trucks account for 39 percent of the transport sector's emissions. In Chile and Uruguay, the share is even higher, at around 60 percent of the total[4] [5] [6]. Figure 5 shows the share of emissions generated by mode of transport for four LAC countries.

Private transport is also a significant source of GHG emissions in LAC, due to its reliance on combustion engines, and inefficient urban design and mobility practices. In Chile, Colombia and Uruguay, cars contribute an average of 26.7 percent of transport sector emissions. In Costa Rica, cars generate more pollution than any other type of vehicle, accounting for 47 percent of total emissions [7].

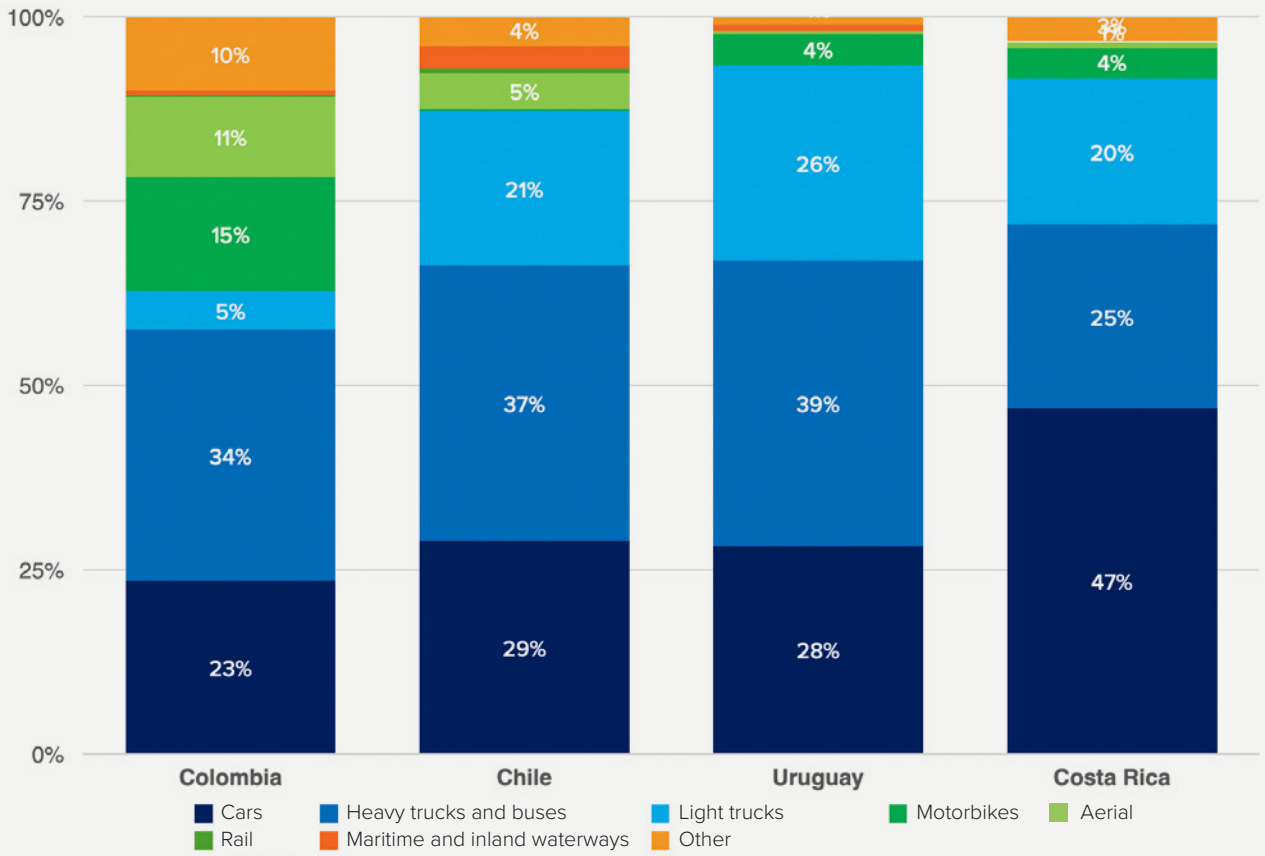
Figure 4. Modes of transport analysed in this study



Source: Authors' own work.

4 In the case of Chile and Uruguay, only aggregated emissions data for heavy trucks and buses are available.

Figure 5. Share of emissions in the transport sector by mode of transport, for Colombia, Chile, Uruguay and Costa Rica



Note: For Uruguay, CO2 emissions were analysed, while other countries are in CO_{2eq}.
Source: Prepared by the authors based on information from the 2020 GHG national inventories of each country [5] [6].

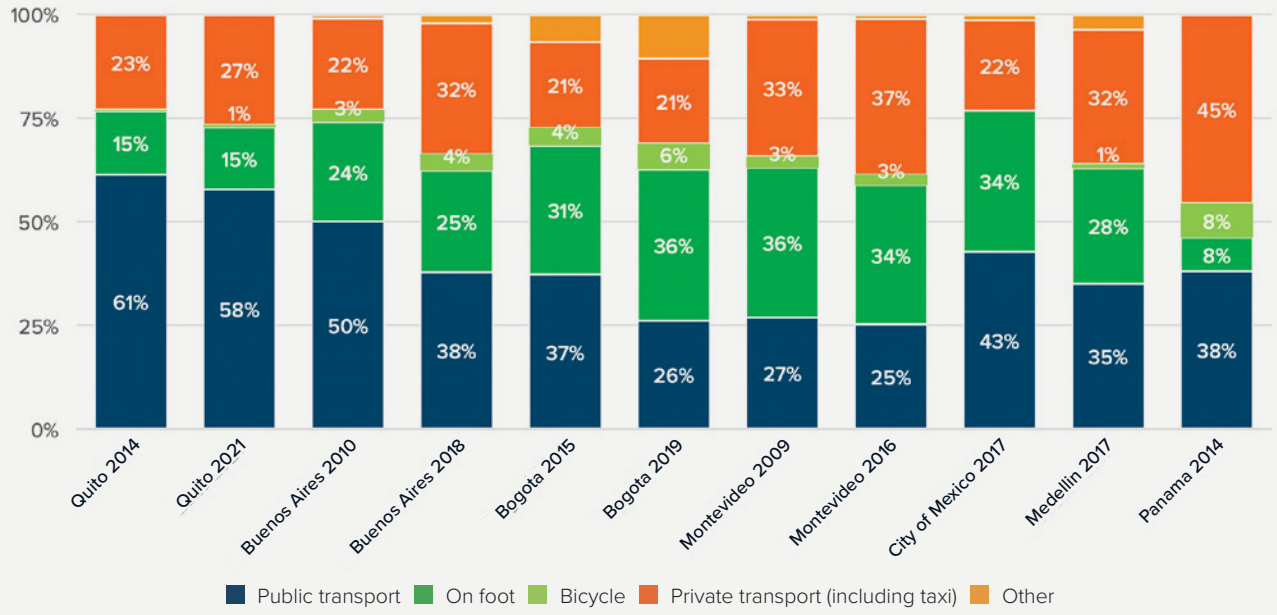
Public transport and non-motorized transport: The need for a commitment to better coverage and quality of service

In most LAC cities, public transport is the most commonly used mode of travel, but journeys on public transport often include some walking or cycling. The most recent mobility surveys in the four countries provide a breakdown of these journeys: in Quito, 58 percent of trips are made by public transport and 15 percent on foot [8]; in Buenos Aires, public transport accounts for 38 percent and walking for 25 percent [9]; while in Mexico City, the figures are 43 percent and 34 percent respectively [10]. In Bogota, 26 percent of trips are made by public transport, and an even higher proportion, 36 percent, are made on foot [11].

Demand for public transport in LAC has fallen, while demand for private transport has risen. Buenos Aires exemplifies this shift: in 2010, public transport accounted for 50 percent of trips in the city, but in 2018 it dropped to 38 percent, while private vehicle travel increased from 22 percent to 32 percent [12] [9]. In Bogota, public transport use fell from 37 percent in 2015 [13] to 26 percent in 2019 [11]. In Quito, use of public transport fell from 61 percent in 2014 to 58 percent in 2021, with a corresponding rise in the use of private vehicles [14] [8]. Figure 6 presents the modal splits of six Latin American cities for the time periods used by the two most recent mobility studies published in each city.

Although several cities have rail and aerial cable car systems, most trips are made by traditional bus or bus rapid transit (BRT) systems. In Buenos Aires and Mexico City, 79 percent and 62 percent of public transport users use buses, respectively [17] [18]. In Medellin, 20 percent of all trips are made on the bus system and 14 percent on the subway [16]. More than

Figure 6. Modal split in selected LAC cities



Note: Comparisons between cities are limited by the time when the surveys were carried out.
Source: Authors' own work based on the origin-destination surveys carried out in Montevideo for 2012 and 2016 [15], Quito for 2014 [14] and 2021 [8], Bogota for 2015 [13] and 2019 [11], Argentina for 2010 [12] and 2018 [9], and Medellin for 2017 [16].

60 cities in LAC have BRT systems; these transport more than 20 million passengers daily through a network of approximately 2,000 km of routes [19].

Most buses in LAC use diesel fuel. According to data from the E-Bus Radar digital platform, by September 2023 there were 4,998 electric buses in the region, equivalent to only 5.63 percent of the vehicle fleet of the public transport systems registered on the platform. Figure 7 shows the number of electric buses per city and their share of the total number of buses in operation.

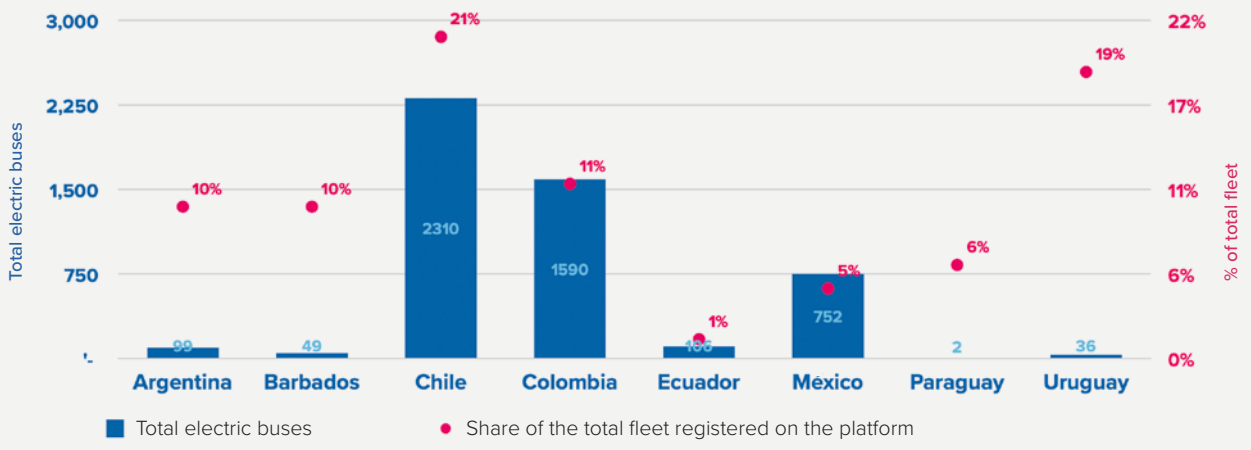
The transport sector, and public transport systems in particular, receives significant subsidies. Fuel subsidies, for example, are common. These subsidies distort the comparative costs of clean transport technologies compared with less costly fossil fuel-based alternatives. In countries such as Colombia, Bolivia and Ecuador, subsidies for liquid fuels influence the selection of propulsion technologies, discouraging public transport managers and freight companies from renewing their fleets. Between 2016 and 2020, these subsidies were equal to between 0.6 percent and 1.3 percent of GDP in LAC. Their impact is even greater when fuel prices are high, as occurred between 2022 and 2023.

Active mobility, particularly walking, plays a crucial role in LAC cities. Walking may be a first- or last-mile solution[5], or even the primary means of travel. The modal split shown in Figure 5 illustrates how, in cities such as Bogota, Mexico City and Montevideo, more than one third of trips are made on foot.

Although bicycle use has grown in LAC, its share of total trips remains low. In Bogota, Buenos Aires and Mexico City trips by bike represent 6.3 percent, 4 percent and 1 percent of trips respectively, indicating a growing interest in cycle mobility as a sustainable alternative. At the other extreme, in cities such as Panama City and Quito, cycling's share of the total trips is close to zero.[6] In terms of infrastructure, only four of the main cities in LAC have more than 200 km of cycle lanes, while eight have less than 50 km.

5 Refers to trips made at the beginning or end of a multimodal trip to reach the destination or connect to a mass transit system.
6 Based on origin-destination surveys carried out by the transport entities of each city: Bogotá 2019 [11], Buenos Aires 2018 [9], Mexico City 2017, Quito 2022 [8].

Figure 7. Number of electric buses per country and share of the total fleet for 2023



Note: It should be taken into account that:
- Data for each country includes the following cities: Argentina: Córdoba, Mendoza, Rosario, San Juan; Barbados: Bridgetown; Brazil: Salvador, Bauru, Brasília, Campinas, Maringá, Santos, São Paulo, Volta Redonda, Diadema, Guarujá, Mauá, São Bernardo do Campo, Sorocaba, Vitória; Chile: La Reina, Las Condes, Santiago, Valparaíso; Colombia: Bogotá, Cali, Medellín; Ecuador: Guayaquil, Quito, Santa Cruz; Guatemala: Guatemala City; Mexico: Mexico City, Guadalajara; Paraguay: Asunción; Peru: Lima; Uruguay: Canelones, Montevideo; Venezuela: Mérida.
- The data was updated on the platform in June 2023.
- The data represents the number of buses reported on the platform, excluding buses not registered or from other cities not included in the analysis.
- It should be noted that, in Ecuador, the trolleybus system operating in the city of Quito since 1995, before the goals were set in the NDCs, accounts for 80 percent of the data. It should be noted that the city is in the process of fleet renewal and expects to have 50 fully electric trolleybuses by 2025.
- For Argentina, 77 percent of the vehicles registered in the portal correspond to trolleybuses in operation in the cities of Córdoba and Rosario, before establishing the NDCs. Both cities have initiatives to renew their trolleybus fleets, but this has not yet materialized.

Source: Authors' own work based on 2023 data from E-Bus Radar [20].

Private transport: Economic growth and its impact on motorization

In LAC, the use of private vehicles has been increasing since the 2010s. To give an example, the use of cars, motorbikes and taxis as the main mode of travel has increased in cities like Buenos Aires (a 10 percent increase between 2010 and 2018), Montevideo (a 4 percent increase between 2009 and 2016) and Quito (a 4 percent increase between 2014 and 2021). These changes are shown in the modal split graph presented in Figure 5, in the previous subsection on public and non-motorized transport. It should be noted that, although a taxi is not a private vehicle, in practice it is used more like a private vehicle than a public transport route.

This rise in private vehicle travel is the result of increased motorization in LAC, which, in turn, is driven by several factors: 1) the greater purchasing power of households that, having previously not had access to sustainable modes of transport, have been able to purchase individual transport vehicles; 2) the low quality and limited coverage of public transport; 3) the failure of traffic restriction policies and policies intended to incentivize other modes; and 4) the absence of measures to increase average vehicle occupancy.

The first factor has contributed to the growth of the vehicle fleet in LAC cities, with more cars and motorbikes. A survey of 29 cities and metropolitan areas showed that between 2007 and 2014, there was a 142.8 percent increase in the number of cars and a 253.1 percent increase in the total number of motorbikes [21]. This increase in motorization is directly correlated with the increase in GDP per capita and population growth, as shown in Figure 8. For example, Uruguay saw a 300 percent increase in GDP per capita between 2005 and 2015, which translated into a 75 percent increase in the motorization rate during the same period. This motorization growth trend

is expected to continue, especially given the projected GDP growth in LAC: the International Monetary Fund estimates a 2.3 percent annual increase between 2024 and 2028.

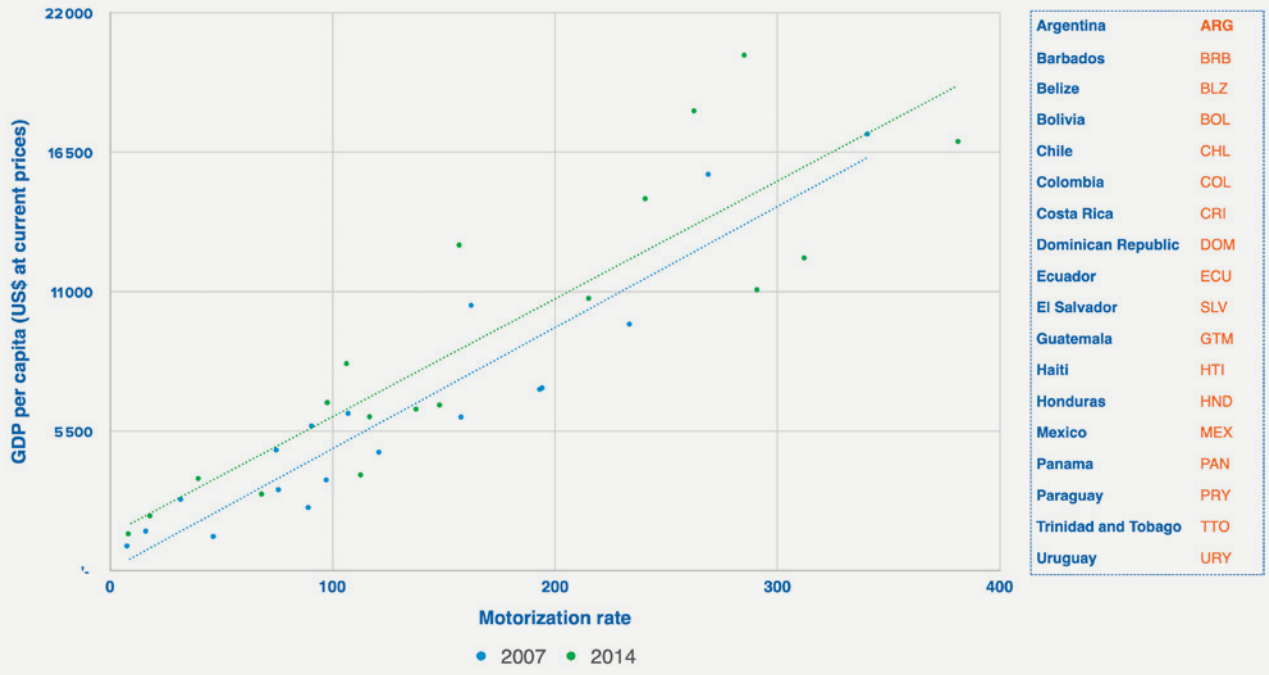
There is a high risk that motorbikes will become a mobility, health and environmental sustainability issue in LAC. The situation in Colombia illustrates this risk, with the motorbike fleet having grown faster than the car fleet, from 2.3 million motorbikes in 2007 to 10.9 million in 2022. By 2020, motorbikes were already generating 15.5 percent of the transport sector's GHG emissions. The rising number of motorbikes has made mobility in cities more chaotic, reflected in a significant increase in accident rates – more than 5,000 motorcyclists were killed in Colombia in 2023. In addition, motorbike taxis have contributed to the financial difficulties of public transport systems by capturing a share of passenger demand.

The low quality and coverage of public transport in LAC encourages the population to switch to private transport. The high levels of overcrowding, low transit frequencies and, in particular, high rates of insecurity in public transport lead citizens to opt to use cars and motorbikes instead of public transport. This trend is exacerbated by gaps in public transport coverage in less centrally located urban areas.

Policies restricting vehicle traffic have increased inequality, failed to solve congestion and caused cities to lose income. Not only do these policies fail to reduce car trips, but they also incentivize the purchase of a second vehicle in households that can afford it. An example of this policy in action is the '*Pico y Placa*' (peak hours and licence plate) scheme in Bogota. Under the scheme, the percentage of households with two or more vehicles increased from 6.5 percent in 2011 to 11.7 percent in 2019. This scheme has benefited car and motorbike dealerships by increasing their sales, while the city has lost the potential income that a congestion charging scheme could generate.

In LAC, low occupancy rates of private vehicles increase the negative externalities of congestion. In Bogota, private transport is used in an inefficient way, as shown by the average occupancy rate of just 1.2 people per vehicle trip [24]. The authorities have implemented strategies to address this inefficiency, exempting vehicles with three or more occupants from

Figure 8. Relationship between the motorization rate and GDP per capita in LAC countries (2007 and 2014)



Source: Authors' own work, based on data from the Economic Commission for Latin America and the Caribbean (ECLAC) 2018 [22] and the World Bank 2022 [23].

the '*Pico y Placa*' restrictions. However, these have not been successful because people use this loophole to get around the restrictions without complying with the objective of consistently higher occupancy.

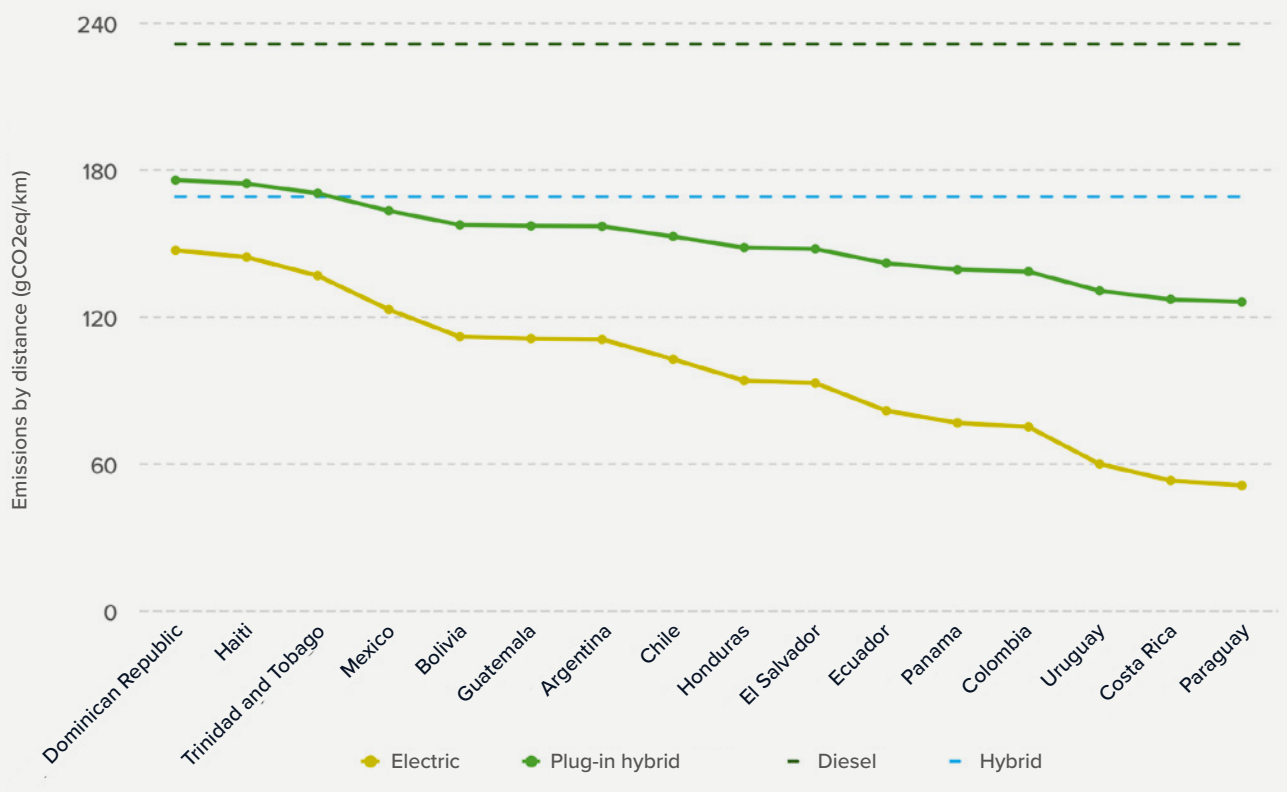
The number of electric vehicles (EVs) in LAC has grown, but their share of total vehicles remains low due to high acquisition costs and the lack of efficient charging networks. In addition, the transition to EVs is not a solution to urban congestion, which can increase GHG emissions due to the longer travel times of combustion vehicles. This effect is known as the 'socioeconomic cost of congestion'.

Reducing GHG emissions by transitioning to battery electric vehicles (BEVs) or hybrids depends on the energy sources used in electricity generation. Countries such as the Dominican Republic, Haiti or Trinidad and Tobago generate a small share of their electricity from renewable sources, with the result that conventional hybrid electric vehicles (HEVs) account for fewer emissions than plug-in hybrid electric vehicles (PHEVs). In countries with cleaner energy mixes, such as Costa Rica and Paraguay, the transition to BEVs and PHEVs is more beneficial. BEVs generate just 52 gCO_2eq/km, compared to 169 gCO_2eq/km for HEVs and 232 gCO_2eq/km for internal combustion engine vehicles (ICEVs). Figure 9 presents data for other countries in the region.

Freight transport: Intermodality and efficient use of rails, rivers and roads

Freight transport comprises operations by road, rail, inland waterway, or an intermodal combination of these. Road transport accounts for 70 percent of total LAC freight transport. Table 1 shows that in Argentina, Chile and Uruguay, road transport accounts for more than 90 percent, while in Colombia and Mexico it represents between 70 and 75 percent. The share of rail transport is largest in Colombia and Brazil, at 27 percent. In Brazil, this share reflects the award

Figure 9. Emissions per km travelled by type of technology and country



Source: Authors' own work, based on LowCarbonPower 2021 [25].

of public-private concessions to rail companies for the transport of minerals and grains [26]. Unfortunately, inland waterway transport is in its infancy in LAC, except in Brazil, where it accounts for 13 percent of the total [27].

Intermodal freight transport is not widespread in LAC. The operational inefficiencies of single-mode transport contribute to the increase in GHG emissions in the region. In Ecuador and Paraguay, for example, intermodal operations are almost non-existent [28]. Transitioning to intermodal operations would reduce emissions by increasing the use of waterways and rail to move freight over long distances, reserving land transport for last-mile trips. As an illustration of the potential energy efficiencies available, one litre of fuel is enough to transport one tonne of cargo 251 km on a river barge, 101 km on a train, but only 29 km on a truck. Figure 10 presents the performance of the different modes of transport.

The freight transport fleet in LAC is mostly relatively low-capacity trucks, which offer lower operational efficiency and generate more emissions than other vehicles. According to the IDB, across LAC, the share of rigid trucks in the fleet is 40 percent or higher, with the sole exception of Nicaragua. In Argentina and Guatemala, rigid trucks account for more than 80 percent of freight vehicles. This prevalence of rigid trucks means more trips are needed to transport a

Table 1. Modal distribution of freight transport by country (percentage of total tonnes moved)

	Road	Railway	Inland waterway and maritime cabotage	Other
Argentina (2008)	95%	4%	1%	no data
Brazil (2011)	56%	27%	13%	4%
Chile (2010)	93%	4%	3%	no data
Colombia (2012)	71%	27%	2%	no data
Mexico (2010)	73%	13%	4%	10%
Uruguay (2006)	92%	3%	1%	4%

Source: Inter-American Development Bank (IDB) 2017 [27].

Figure 10. Performance of transport modes

Source: Based on information from DNP 2020 [29].

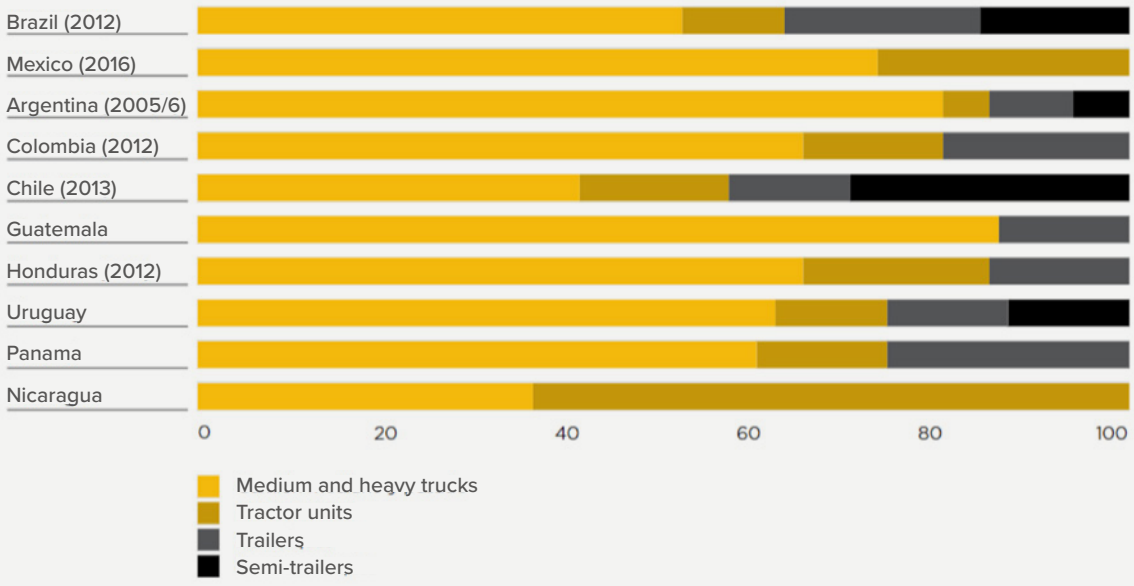
given load, increasing emissions. In addition, these trucks use more energy than combination vehicles. The energy consumption per tonne of a semi-trailer truck is only 40 percent of that of a rigid two-axle truck; using B-trains can reduce this consumption further, to 32 percent. In Colombia, expanding the use of combination vehicles could reduce environmental impact by 27 percent and operational congestion by 46 percent, according to figures from the National Planning Department [27]. Figure 11 presents the composition of freight transport fleets for several LAC countries.

In LAC, the freight vehicle fleet is ageing, which also contributes to increased GHG emissions. Steps could be taken to resolve this problem. It is estimated that ICEVs lose 0.5 percent of their energy efficiency each year due to engine wear. In LAC, the average age of the freight vehicle fleet is 15 years. Countries such as Chile and El Salvador have a younger fleet (11 years), while Argentina (14 years), Costa Rica, Guatemala and Panama (15 years) have fleets closer to the average age. Colombia, the Dominican Republic, Honduras, Mexico, Nicaragua, Paraguay and Uruguay have older fleets, exceeding 15 years. In contrast, in the United States, the average age of fleet is seven years.

Lack of oversight and lax regulations allow older, high-emission vehicles to stay on the road in LAC. Figure 12 presents the fleet distribution by Euro emissions standard for several LAC countries. Freight vehicles older than 15 years do not meet any Euro emissions standards, while those aged between 10 and 15 years only meet Euro I standards. However, vehicles that meet Euro II and above generate significantly fewer emissions, and the reduction is even greater for Euro IV engines and above. Unfortunately, no countries have regulatory or financial incentives in place to encourage owners of older vehicles to switch to more efficient technologies. In addition, some owners fail to carry out preventive and predictive maintenance; this increases inefficient fuel consumption and GHG emissions.

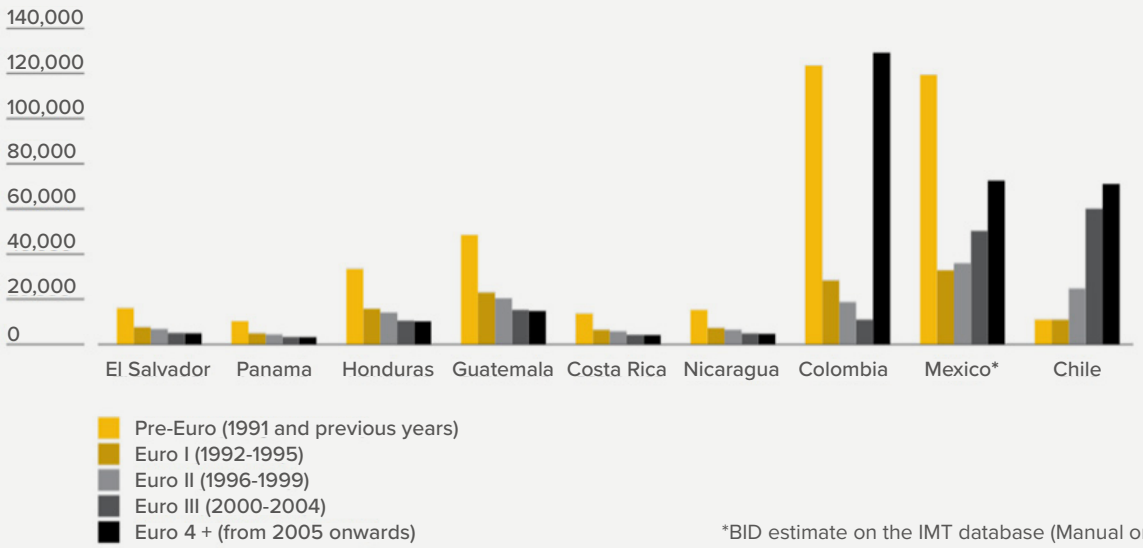
Ownership of freight vehicles in LAC is not concentrated. Instead, it is generally shared among many small-scale owners, which hinders fleet renewal and affects the sustainability of the sector. In Brazil, which is the largest freight transport market in Latin America, owners have, on average, fewer than three vehicles, and 98 percent own fewer than eight vehicles [30]. In Colombia, 83 percent of the owners classified as individuals and 61 percent

Figure 11. Composition of the freight transport fleet in several LAC countries



Source: IDB 2017 [27].

Figure 12. Distribution of the vehicle fleet by age and emissions standards in some LAC countries



*BID estimate on the IMT database (Manual on Transport Statistics, 2011), study led by L.D'Artois

Source: Inter-American Development Bank (IDB) 2017 [27].

of the owners classified as companies have only one vehicle [31]. In Chile, 39,000 such companies have only one truck [27] Lack of access to financing limits these smaller-scale owners from investing in modern fleets, preventing the adoption of clean technologies and perpetuating the use of older vehicles that generate higher operating costs.

The dispersion among owners of freight transport companies in LAC and the lack of centralized controls generate operational inefficiencies, such as an increase in empty trips. Trade between LAC countries tends to be unbalanced, resulting in a demand for freight transport that is also unbalanced in a geographical sense. This situation, together with the lack of centralized control to efficiently allocate resources, increases the number of empty kilometres, therefore generating unnecessary GHG emissions.

2 Measures and strategies for the transport sector proposed by the NDCs and LTSs of each country

2. Measures and strategies for the transport sector proposed by the NDCs and LTSs of each country

This chapter evaluates transport sector actions related to the NDCs and LTSs of 20 LAC countries. Specifically, it analyses measures to reduce emissions from transport, using the methodology described in Annex 3 to classify and categorize the actions. The next chapter presents a detailed analysis of progress and good practices in the implementation of transport measures in four key countries, Chile, Colombia, Mexico and Uruguay, which have made notable efforts to improve various modes of transport.

2.1. Low-emission transport measures in NDCs

The analysis in this chapter looks at the NDCs from four angles:

1. **Transport supply:** services and resources available to users, such as railways and roads, frequency and capacity of transport. The term covers public transport, light vehicles, non-motorized transport and freight.
2. **Demand management:** strategies to influence mobility and transport service consumption patterns, reduce GHG emissions and promote sustainable mobility.
3. **Urban planning:** actions to ensure the organized development of urban areas, addressing land use, transport and environmental conservation to increase sustainability and accessibility.
4. **Gender equality and social inclusion (GESI):** strategies for addressing gender-based inequalities and social and economic disparities, promoting justice for historically marginalized groups.

Figure 13. Sustainable transport measures in NDCs and LTSs: Areas of analysis

Source: Authors' own work.

This analysis focuses exclusively on land transport, excluding both air and maritime transport. Air and maritime transport need to be considered separately because of the international nature of these industries and their consequent emissions. In addition, there have not yet been any specific proposals for these areas in the most recent NDCs. The scope of this study is limited to actions related to domestic transport in each country, as this is the scope stipulated in the NDCs and LTSs.

Although GHG emissions from the use of fuels in international aviation and shipping do fall within the scope of the United Nations Framework Convention on Climate Change (UNFCCC), they are not taken into account in national emissions inventories or in the NDCs. It is difficult to attribute these emissions to a specific country as international travel crosses multiple nations, meaning that responsibility for them can be unclear.

The UNFCCC has therefore delegated the management of these emissions to the International Civil Aviation Organization and the International Maritime Organization, which have developed emissions-management plans such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).

Measures such as efficient airport and port management can reduce fuel consumption by reducing waiting times for aircraft landing and take-off, as well as ship docking and departure. In countries with significant domestic flights and cabotage, such as Argentina, Brazil and Mexico, these actions offer effective ways to strengthen the NDCs.

The NDCs of the 20 LAC countries that propose transport-related measures vary in detail and specificity. Some are general, such as those of El Salvador, Honduras and Trinidad and Tobago, which set goals without detailing specific actions. Others, such as those of Argentina, Barbados, Belize, Bolivia, Dominica, Ecuador, Mexico and Paraguay, propose strategies and actions but do not give specific figures. A few, such as those of Chile and Panama,[7] include measures based on medium- and long-term modelling scenarios, but do not make these binding commitments within their NDCs. However, some countries present specific measures and quantifiable targets in their NDCs, such as Antigua and Barbuda, Colombia, Costa Rica, the Dominican Republic, Guatemala and Uruguay. Another difference is that some countries, such as Argentina, Colombia and Chile, set a general reduction target covering all economic sectors, while others, such as Belize and Trinidad and Tobago, focus on specific GHG emission reduction targets in the transport sector.

All 20 countries include actions on transport supply in their NDCs. Nineteen countries include actions on gender and inclusion, while only five address demand management and just three propose urban planning initiatives. The one country with no actions on gender and inclusion is Trinidad and Tobago. The five countries that include actions on demand management are Barbados, Colombia, the Dominican Republic, El Salvador and Mexico. Finally, Colombia, Costa Rica and Mexico are the only three countries with actions on urban planning and land use, aimed at improving urban mobility. Table 2 presents a summary of the NDCs in the 20 countries, in terms of their actions in the four areas analysed.

The countries in the region focus on actions to improve the transport supply, with 77 actions in total, most of them focused on electrification. This shows considerable ambition for their targets, given the complexity of decarbonizing transport. However, politically acceptable initiatives are given priority over proposals that may be more realistic and viable from an economic perspective.

Demand management and urban planning commitments need to be strengthened to complement new transport projects. LAC countries need to make more commitments to reducing citizens' need to travel and encourage them to voluntarily change their transport mode. In addition, countries must shorten travel distances, create cities with multiple economic and transport hubs, and develop land use plans adapted to climate change mitigation and adaptation.

7 Here it is important to clarify that, for countries such as Chile and Panama, the hypothetical measures of their (non-binding) medium- and long-term modelling scenarios, described in their NDCs, have been counted as actions when preparing this analysis. This is in order to have a baseline for understanding where these countries are thinking of orienting their NDC strategies.

Table 2. Summary of NDC activities related to low-emission transport in LAC, by area of analysis and country

	Supply	Demand management	Urban planning	GESI
# countries with actions	20	5	3	19
Antigua and Barbuda	4			1
Argentina	8			2
Barbados	3	1		1
Belize	2			1
Bolivia	1			1
Chile	1			1
Colombia	6	2	1	1
Costa Rica	8		1	3
Dominica	3			1
Ecuador	2			1
El Salvador	2	1		2
Guatemala	1			1
Haiti	3			1
Honduras	1			1
Mexico	4	1	1	2
Panama	1			1
Paraguay	8			1
Dominican Republic	11	2		2
Trinidad and Tobago	2			
Uruguay	6			2
# Total actions	77	7	3	26

Source: Authors' own work based on updated NDCs available in the NDC Registry.

The analysis highlights that the NDCs contain 26 actions related to gender equality and social inclusion that can be linked to transport. These actions are cross-cutting and should guide the development of initiatives in the field of transport and beyond. Taking into account the needs of women and vulnerable groups not only contributes to more effective public policies, but also a more comprehensive view of each country's commitments.

The analysis has also identified actions that, although not part of the NDCs, aim to limit and mitigate transport emissions. These are usually regional or local initiatives that promote sustainable transport through specific activities. These initiatives could enhance updated versions of each country's NDC and broaden their ambition.

2.1.1. Measures focused on transport supply

In the context of the NDCs, LAC countries have developed a series of initiatives to improve and diversify their transport supply in order to reduce GHG emissions and promote sustainable development. This section will examine those initiatives, which relate to the four modal categories presented in section 1.2. Below is an overview of the findings for each category:

- **Public transport:** In their NDCs, the countries studied prioritize electrifying buses to reduce emissions. However, it is crucial that they adopt comprehensive measures to improve the service, expand routes, promote intermodality, offer affordable fares, and advocate alternatives such as hydrogen in regions where electricity comes largely from fossil fuels.
- **Light vehicles:** The NDCs studied prioritize electromobility. However, greater use of electric vehicles will not solve problems with congestion, travel times and the equitable distribution of urban space. It is therefore essential that countries increase their level of ambition in terms of promoting more sustainable modes of transport.
- **Freight transport:** The most common strategies in the NDCs are to renew fleets, adopt green hydrogen technologies and improve energy efficiency. They prioritize the electrification of light commercial vehicles in urban areas. However, only a few countries have initiatives to reduce emissions in this sector.
- **Non-motorized transport:** The NDCs seek to promote the use of bicycles and improve bicycle infrastructure, such as cycle paths and cycle parking. They also focus on improving pedestrian conditions, through better pavements and more pedestrian zones.

Table 3 shows activities related to transport supply in the NDCs, by mode of transport. If it impacts more than one mode of transport, an activity can be counted several times.

In these NDCs there is a strong focus on public transport (38 actions), followed by light vehicles (31), freight transport (24) and non-motorized transport (9). There are few actions related purely to fuels (7).

Although the importance of public transport is recognized, there is less emphasis on freight and non-motorized transport, despite the latter offering strategic potential for reducing emissions and strengthening sustainable development. Future updates to the NDCs should increase the level of ambition and commitments in these areas, especially considering that freight transport contributes significantly to the sector's emissions in several countries.

The NDCs studied pay significant attention to private transport with light vehicles. However, the long-term sustainability of countries' plans for this mode of transport depends on various factors, such as the emissions produced by each country from electric power sources, from the development of charging networks and infrastructure, and from recycling vehicle parts. In addition, it is necessary to evaluate the feasibility of making electric cars accessible to more people globally.

Of the 20 countries, 18 have chosen to improve low-emission public transport; 15 countries propose initiatives for light vehicles, 10 for freight transport and only 9 for non-motorized transport. Except for Guatemala and Haiti, all the countries have made commitments to improve public transport. Most of them also promote a transition to cleaner light vehicles (with the exceptions of Belize, Bolivia, Ecuador, Mexico and Trinidad and Tobago). Around half of the countries include actions related to freight and non-motorized transport in their NDCs for the two modes.

Argentina, Chile, Colombia, Costa Rica and the Dominican Republic have activities related to all the modes of transport analysed. Antigua and Barbuda, Barbados, Belize, Guatemala, Mexico, Paraguay and Uruguay propose fuel-focused initiatives, promoting actions such as a migration to biofuels, changes in fiscal policies on fossil fuels (taxes, removal of subsidies), labelling standardization and energy efficiency.

Measures for low-emission public transport

The NDCs with public transport-related actions focus on three means of transport: bus, subway/train and, to a lesser extent, aerial cable car. All the countries

Table 3. Summary of NDC activities related to low-emission transport supply in LAC, by mode and country

	Public transport	Light vehicles	Freight	Non-motorized	Fuels/energy
# countries with actions	18	15	10	9	7
Antigua and Barbuda	2	3	1		1
Argentina	3	2	4	1	
Barbados	2	1		1	1
Belize	1				1
Bolivia	1				
Chile	1	1	1	1	
Colombia	1	1	5	1	
Costa Rica	3	3	3	1	
Dominica	1	2		1	
Ecuador	2		1		
El Salvador	2	1		1	
Guatemala		1			1
Haiti		3			
Honduras	1	1			
Mexico	2		1	1	1
Panama	1	1			
Paraguay	3	4	5		1
Dominican Republic	8	3	1	1	
Trinidad and Tobago	2				
Uruguay	2	4	2		1
Total	38	31	24	9	7

Source: Authors' own work based on updated NDCs available in the NDC Registry.

analysed propose actions to reduce bus emissions, except for Guatemala and Haiti. Costa Rica, the Dominican Republic, Ecuador, Mexico and Paraguay propose actions for passenger railway services. Only the Dominican Republic includes actions for aerial cable cars in its NDC. Table 4 shows the number of activities by means of transport and by country.

For public transport, most LAC countries are focused on electrifying their fleets, and in some cases migrating to natural gas or Euro 5 technologies and higher, as is the case in Argentina. Other proposals include strengthening integrated transport systems in cities and offering financial and tax incentives for low-emission buses.

For rail transport, the aim is to implement and consolidate electric subway and commuter train systems. Mexico and Paraguay are also considering expanding these networks with non-electric rolling stock, but this would still create networks that are more efficient in terms of emissions per passenger than diesel buses or private transport.

The Dominican Republic is the only country with actions related to aerial cable cars in its NDC. Several other countries have introduced similar systems but do not include them in their NDCs, even though this could increase the level of ambition of their goals.

Another key initiative is to establish legislation to promote the use of low-emission vehicles. Uruguay

Table 4. Summary of NDC activities related to low-emission public transport in LAC, by means of transport and country

	Low-emission propulsion technologies for buses	Institutional and regulatory	Fleet renewal	Implementation or commissioning of rail or cable car systems	Energy efficiency	Infrastructure for buses	Package of actions for a modal shift
# countries with actions	14	5	2	5	3	2	1
Antigua and Barbuda		1			1		
Argentina	1	1	1				
Barbados	2						
Belize	1						
Bolivia	1						
Chile	1						
Colombia	1						
Costa Rica			1	1	1		
Dominica	1						
Ecuador		1		1			
El Salvador	1						1
Honduras	1						
Mexico	1			1			
Panama	1						
Paraguay	2			1		1	
Dominican Republic	4	1		2		1	
Trinidad and Tobago					2		
Uruguay	1	1					
# Total actions	19	5	2	6	4	2	1

Source: Authors' own work based on updated NDCs available in the NDC Registry.

has some of the strongest proposals in this area: By 2030, it will have developed regulations, capacities and incentives for the implementation of its Green Hydrogen Roadmap.

Measures for low-emission light vehicles

Actions for light vehicles, a category that covers vehicles such as cars, motorbikes, taxis, mostly focus on cars. Of the 20 countries analysed, 14 propose some form of action for this type of vehicle. Only 10 propose actions for taxis, and 7 for motorbikes. It should be noted that, although taxis are a form of public transport, they are considered light vehicles due to their similarities with private transport.

LAC countries are focused on gradually electrifying the private car fleet. Some, such as Antigua and Barbuda, Barbados and the Dominican Republic, plan to ensure that by 2030 all new vehicles sold are low-emission, and preferably electric. Other countries, such as Chile, Colombia, Costa Rica, Guatemala, Panama and Uruguay, have set intermediate targets for new vehicles, aiming for between 8 and 60 percent of them to be electric. Meanwhile, Argentina, Dominica, El Salvador, Honduras and Paraguay promote the transition to low-emission vehicles without committing to a specific figure. Some countries, such as Argentina and Costa Rica, have proposed activities related to the energy efficiency of propulsion technologies. Finally, Uruguay has proposed measures aimed at increasing the use of biofuels for this type of vehicle.

For motorbikes, the activities proposed focus on their electrification. Costa Rica intends to establish standards for the transition of its motorbike fleet to electric technology, while Paraguay is aiming for 20 percent penetration of electric motorbikes by 2050. Motorbikes will count towards Colombia's target number of electric vehicles; the country aims to introduce 600,000 electric vehicles by 2030.

In most of the countries studied, actions on taxis involve electrification. Chile, Colombia and the Dominican Republic propose to electrify their taxi fleets. Meanwhile, countries such as Argentina, Barbados, Costa Rica, Dominica, Paraguay and Uruguay are focusing on the electrification of the light vehicle fleet in general, including taxis. Table 5 presents a summary by country and by type of activities proposed in their NDCs related to light vehicles.

With respect to regulatory frameworks, Antigua and Barbuda proposes a progressive ban on the import of ICEVs starting from 2025. This demonstrates the region's ambition to implement a regulatory framework that encourages the incorporation of low-emission vehicles into the region's markets.

Measures for low-emission freight transport

Half of the countries in this study (10) have established measures related to freight transport in their NDCs. Of these, nine countries have activities related to heavy goods vehicles and light commercial vehicles. Five countries have activities related to rail transport and three have activities related to waterway transport. Table 6 shows actions related to freight transport by country.

Table 5. Summary of NDC activities related to low-emission light vehicles in LAC, by means of transport and country

	Low-emission propulsion technologies			Institutional and regulatory			Energy efficiency			Biofuels		
	Car	Motorbike	Taxi	Car	Motorbike	Taxi	Car	Motorbike	Taxi	Car	Motorbike	Taxi
# countries with actions	13	3	9	5	5	4	1	2	1	2	0	0
Antigua and Barbuda	1			1	1	1	1	1	1			
Argentina	1		1	1	1	1						
Barbados	1		1									
Chile	1		1									
Colombia	1	1	1									
Costa Rica	1		1		1							
Dominica	2		1									
El Salvador												
Guatemala	1											
Haiti				1		1		2				
Honduras	1											
Panama	1											
Paraguay	1	3	1							1		
Dominican Republic	1		1	1	1	1						
Uruguay	1	1	2	1	1					1		
# Total actions	14	5	10	5	5	4	1	3	1	2	0	0

Source: Authors' own work based on updated NDCs available in the NDC Registry.

Actions in the LAC NDCs for road freight transport focus on renewing fleets, using green hydrogen and improving energy efficiency. Argentina and Colombia prioritize fleet renewal, which is appropriate given the high average age of these vehicles in LAC. Chile, Paraguay and Uruguay propose using green hydrogen. Antigua and Barbuda, Argentina, Colombia and Costa Rica focus on improving energy efficiency by introducing new standards or through smart driving.

In urban settings, electrification and fleet renewal are the preferred solutions for light commercial vehicles. Colombia, Paraguay and Uruguay commit to further electrifying urban logistics.

Proposals for intermodal transport focus on revitalizing rail transport. Argentina, Colombia, Costa Rica, Mexico and Paraguay seek to revitalize and expand rail transport. In addition, Colombia and Paraguay are also considering measures to improve the navigability of their rivers, and Argentina plans to renovate its river fleet, transitioning to alternative energies. Costa Rica is the only LAC country to establish a specific commitment to sustainable logistics at ports, urban areas and freight centres.

Measures for non-motorized transport

Of the 20 countries covered in this analysis, 9 have activities related to active mobility (non-motorized), mainly concerning cycling. Of these nine countries, seven have also developed actions involving the pedestrian mode. These are linked to urban planning and land use management initiatives. To make pedestrian and bicycle travel easier, the distances people must cover need to be shortened through better territorial planning, for example. However, this subsection refers only to activities that promote walking and cycling.

Bicycle-related activities focus on promoting modal shift and improving infrastructure, such as cycle paths and cycle parking. Argentina, Barbados, Chile, Colombia, Costa Rica, Dominica, El Salvador, Mexico and the Dominican Republic include this type of activity.

Table 6. Summary of NDC activities related to freight transport, by means of transport and country

	Low-emission propulsion technologies			Fleet renewal			Energy efficiency			Infrastructure, logistics and modal shift				Institutional and regulatory			Total			
# countries with actions	4	1	0	2	0	1	4	0	0	0	3	2	1	3	1	0	9	5	3	1
Antigua and Barbuda							1										1			
Argentina				1		1	1								1		2	1	1	
Chile	1																1			
Colombia	1			1			1				1	1					3	1	1	
Costa Rica		1					1						1				1	1		1
Ecuador														1			1			
Mexico											1							1		
Paraguay	2										2	1					2	2	1	
Dominican Republic														1			1			
Uruguay	1													1			2			
# Total actions	5	1	0	2	0	1	4	0	0	0	4	2	1	3	1	0	14	6	3	1

Road Rail Waterways Logistics Intermodal

Source: Authors' own work based on updated NDCs available in the NDC Registry.

In addition, Colombia's NDC proposes implementing public bike share systems, which would include pedal-assist electric bikes.

Measures for the pedestrian mode focus on improving pavements, implementing traffic calming zones and ensuring safe crossings and accessibility. However, only seven countries have included actions for pedestrian mobility in their NDCs, so there is an opportunity for more countries to strengthen their commitments in this regard.

Decarbonizing transport requires more people to adopt walking and cycling as their main means of transport, so LAC countries need to strengthen their NDC commitments regarding active mobility. This is the only way to change the prevailing dynamics, in which mobility is currently based on the use of fossil fuels. Table 7 details NDC actions related to non-motorized transport by country.

2.1.2. Measures focused on demand management

Transport demand management can help reduce GHG emissions. Five countries have included measures in their NDCs to influence citizens' transport choices, promoting sustainable options. There is an opportunity for other countries to adopt similar approaches, to encourage the use of public and non-motorized transport. Figure 14 shows the countries that include demand management measures in their NDCs and the means of transport that would be impacted by these measures.

These five countries aim to reduce the use of private transport through strategies such as traffic and parking management (Barbados, Colombia and El Salvador) or policies that prioritize sustainable transport (Dominican Republic) or promote remote working (Mexico). In this

Table 7. Summary of NDC activities related to non-motorized transport in LAC, by means of transport and country

	Low-emission propulsion technologies		DOT		Infrastructure		Modal shift	
	🚲	🚶	🚲	🚶	🚲	🚶	🚲	🚶
# countries with actions	**2**	**1**	**2**	**2**	**3**	**2**	**3**	**2**
Argentina							1	1
Barbados	1	1						
Chile	2							
Colombia			1	1			1	
Costa Rica					1	1		
Dominica					1	1		
El Salvador							1	1
Mexico			1	1				
Dominican Republic					1			
# Total actions	**3**	**1**	**2**	**2**	**3**	**2**	**3**	**2**

🚲 Bicycle 🚶 Pedestrian

Source: Authors' own work based on updated NDCs available in the NDC Registry.

group, Colombia stands out for its comprehensive approach to the promotion of non-motorized transport, which includes actions to shorten trips and encourage the use of this type of transport for shorter trips.

2.1.3. Measures focused on urban planning

Colombia, Costa Rica and Mexico include Transit-Oriented Development (**TOD) criteria in their NDCs to promote urban design that encourages the use of public and non-motorized transport**, thereby reducing dependence on private vehicles. TOD seeks to reduce emissions, ensure efficient land use, prevent uncontrolled urban sprawl, encourage mixed-use development and shorten distances, making it more efficient for people to travel by public and non-motorized transport.

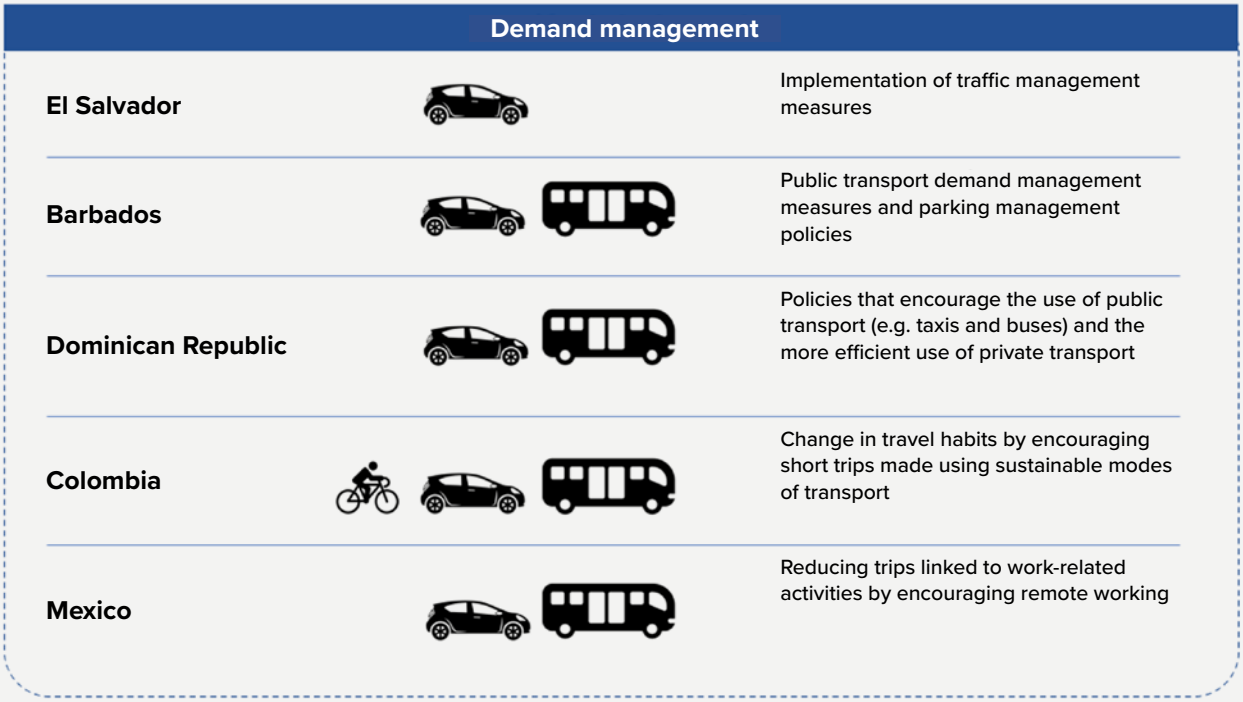
Despite its benefits, few countries address urban planning in their NDCs, resulting in a limited number of far-reaching solutions to improve mobility and quality of life. In future updates to their NDCs, LAC countries should therefore consider sustainable urban planning as a viable and efficient approach to mitigating emissions from the transport sector.

2.1.4. Cross-cutting measures focused on gender equality and social inclusion (GESI)

This section assesses how countries address the GESI component in their NDC objectives and activities, and whether they propose specific actions in the transport sector or only cross-cutting actions across all sectors.

Of the 20 countries assessed, 19 incorporate GESI issues in a cross-cutting manner in their updated NDCs. This means that many LAC countries recognize that climate change affects women, children and Indigenous communities in specific ways, and that gender inequalities exist in relation to access to and control of natural resources. The objectives of their NDCs therefore include cross-sector commitments to prioritizing participation by women, young people, Indigenous and other historically excluded groups

Figure 14. Countries with NDC activities that include demand management components, and the means of transport targeted



Source: Authors' own work based on updated NDCs available in the NDC Registry.

in the design of strategies and decision-making for climate change mitigation and adaptation.

Moreover, some countries not only incorporate GESI issues in a cross-cutting manner but also propose measurable actions to ensure participation by these underrepresented groups. Argentina, Colombia, Costa Rica, Dominica, El Salvador, Honduras, Panama and Uruguay have included commitments in their NDCs to address GESI in the context of climate action, with the following notable examples:

Argentina and Colombia have committed to creating sustainable and decent jobs in sectors such as transport. Specifically, their strategy for the just transition of the workforce to a low-carbon economy promotes the inclusion of historically underrepresented groups.

Costa Rica proposes implementing its 'Gender Equality and Climate Change Action Plan' in 2022 and to develop, between 2022 and 2024, a strategy for a just transition to a low-carbon economy. This will include identifying green and blue jobs and reducing the digital divide in vulnerable communities.

Dominica proposes developing a 'Gender Mainstreaming Roadmap' for 2021 to 2030, to cover five key sectors and guide the country's Climate Resilience strategy and gender equality objectives.

El Salvador plans to increase pilot testing and improvements in areas vulnerable to climate change during 2024–2025 and will ensure equitable access to sustainable transport infrastructure, with a special focus on safety and accessibility for women and young people.

Honduras integrates a gender perspective as well as the views of Indigenous People, people of African descent and young people into its climate action plans for 2030, with the creation of a working group, a social inclusion strategy and a transparency framework that includes gender indicators.

Panama intends to develop a gender action plan for mainstreaming gender in the activities and programmes set out in its NDC.

In line with its National Gender and Climate Change Strategy, Uruguay's NDC measures include recommendations and commitments related to gender equality, so that women are included in the actions derived from climate change strategies and that they benefit from them.

Overall, these commitments ensure that climate action in LAC promotes gender equality, social justice and inclusive development.

2.2. Low-emission transport measures in the LTSs of LAC countries

Of the 20 countries analysed in this study, 8 have long-term strategy documents (LTSs).[8] It is important to analyse how these LTSs align with the NDCs. In general, they strive for actions that aim to achieve carbon neutrality by 2050. Figure 15 shows the countries **analysed in this study** that have an LTS.

Figure 15. LAC countries that have submitted their LTS on low-emission transport to the UNFCCC secretariat

Source: Author's elaboration based on updated LTS available at UNFCCC Registry.

2.2.1. Overview of the measures proposed

The LTSs address four areas: supply, demand, urban planning, and gender and inclusion. Belize, Chile, Colombia, Costa Rica and Guatemala have guidelines for all four areas, demonstrating their commitment to the transition to cleaner transport. In general, however, the focus is on supply. Chile and Mexico are the two exceptions as they also have a focus on demand management: use of technological innovations for sustainable development and promotion of remote working, respectively. In addition, some countries include measures related to TOD and/or a cross-cutting gender and inclusion perspective.

The LTSs of Chile, Colombia and Costa Rica stand out as leading examples in the region. According to the Climate Action Tracker, these countries have some of the best-designed LTSs worldwide, surpassing the European Union and the United Kingdom. Chile's LTS was even recognized in 2023 as one of the best in the world by the World Resources Institute [32]. This shows that, in some countries of the region, climate policy is very well structured.

Chile's LTS addresses all sectors and GHGs and supports its ambitions with detailed analyses of emissions pathways. It includes plans to reduce emissions by developing sustainable industry, green hydrogen, electromobility and sustainable construction, by retiring coal-fired power plants and by increasing energy efficiency and CO_2 capture from forests. In addition, Chile has estimated the necessary investments with assistance from UNDP [33]. Transport requires major investment, but also offers the highest return of all the components of the energy sector, accounting for 50 percent of Chile's carbon reduction goals. The other 50 percent of the goals will be achieved through changes to forestry and land use.

Colombia's LTS makes transformative proposals, referred to as "*apuestas*", focused on aspects such as climate governance, biodiversity, sustainable consumption and production, a just labour transition, rural and urban development, energy diversification, sustainable mobility and adaptation to climate change.

Costa Rica's LTS identifies priority actions for decarbonization, including the transformation

8 Countries with LTSs: Argentina, Belize, Chile, Colombia, Costa Rica, Guatemala, Mexico and Uruguay.

of transport and agriculture, electrification with renewable energy, institutional reforms for sustainable production and consumption, and green fiscal reforms for zero-emission development.

2.2.2. Activities focused on transport supply

Table 8 shows the number of activities related to low-emission transport in the LTSs of eight countries.

In LAC, LTSs continue to focus on public transport in particular, with the 20 countries proposing a total of 29 measures for this mode. There are also a high number of proposals (25) for freight transport, often involving technologies such as green hydrogen. Many proposals (21) seek to strengthen vehicle charging infrastructure and establish regulations to promote the acquisition of light vehicles. With regard to fuels and energy efficiency, 10 proposals have been identified.

Non-motorized transport receives less attention than other modes, with only seven related proposals in the LTSs, despite its high importance for reducing emissions from the transport sector. Demand management is also underrepresented, with only Belize, Chile and Mexico making proposals to reduce journeys.

Strategies for low-emission public transport

LTSs in LAC continue to substantially support the electrification of public transport by implementing integrated transport systems and providing financial and tax incentives. Argentina, Costa Rica and Guatemala stand out as the only countries whose LTSs include plans to introduce rail systems over the long term, i.e. by 2050.

However, these LTSs also prioritize regulatory and institutional policies that promote sustainable mobility, in addition to fleet electrification. The analysis shows that 34 percent of the strategies focus on electrifying buses and 21 percent on institutional and regulatory aspects, particularly the adoption of mobility master plans and regulations (Argentina, Chile, Guatemala and Mexico). Argentina also stands out for its institutional approach to rail systems. With regard to energy efficiency, Belize, Colombia and Mexico seek to reduce fuel consumption per passenger by 2050. The only country with actions focused on improving existing services is Guatemala, which plans to improve the level of service of urban BRT in the Guatemala City area. Table 9 shows the public-transport-related actions in the LTSs, by type and country.

Table 8. Summary of LTS activities related to the supply of low-emission transport in LAC, by mode

	Public transport	Light vehicles	Freight	Non-motorized	Fuels/energy
# countries with actions	8	8	8	5	5
Argentina	1	1	1		
Belize	2	4	2		1
Chile	4	2	2	3	2
Colombia	8	5	8	1	5
Costa Rica	3	4	3	1	1
Guatemala	4	1	1	1	1
Mexico	6	3	6	1	
Uruguay	1	1	2		
Total	29	21	25	7	10

Source: Authors' own work based on LTSs available on the UNFCCC website.

Strategies for low-emission light vehicles

With regard to light vehicles, LTSs in LAC prioritize the transition to low-emission technologies for private vehicles and taxis. In addition, Belize, Colombia, Costa Rica and Uruguay have proposals for electrifying motorbikes. Table 10 shows the vehicle-related actions in the LTSs, by type and country.

Strategies for low-emission freight transport

In LAC, the LTSs for freight transport focus on the transition to low-emission technologies. Chile and Costa Rica propose to switch to a green hydrogen-powered fleet by 2050, and Costa Rica also includes measures for rail freight in its LTS.

Table 9. Summary of LTS activities related to low-emission public transport in LAC, by activity type, means of transport and country

Bus / Subway/train	Low-emission propulsion technologies		Institutional and regulatory		Energy efficiency		Modal shift		Fleet renewal		Innovation and service improvements		Infrastructure	
# countries with actions	5	1	4	1	3	0	2	0	2	0	1	0	2	1
Argentina			1	1										
Belize	1				1									
Chile	2		2											
Colombia	4				2		1		1					
Costa Rica	2	2					1							
Guatemala			1								1		1	1
Mexico			2		2				1				1	
Uruguay	1													
# Total actions	10	2	6	1	5	0	2	0	2	0	1	0	2	1

Source: Authors' own work based on updated LTSs available on the UNFCCC website.

Table 10. Summary of LTS activities on low-emission light vehicles in LAC, by activity type and country

Car / Motorbike / Taxi	Low-emission propulsion technologies			Institutional and regulatory			Energy efficiency			Modal shift			Fleet renewal		
# countries with actions	9	4	5	1	1	1	3	0	3	1	1	2	3		2
Argentina				1	1	1									
Belize	2	1					1		1						
Chile	2		2												
Colombia	4	1	3										1		1
Costa Rica	1	1								1	1	2			
Guatemala													1		
Mexico							2		2				1		1
Uruguay		1													
# Total actions	4	4	2	1	1	1	2	0	2	1	1	1	3	0	2

Source: Authors' own work based on updated LTSs available on the UNFCCC website.

The LTSs also seek to strengthen regulatory frameworks to encourage fleet renewal and promote energy efficiency. In addition, Colombia, Costa Rica and Mexico aim to improve freight logistics to reduce emissions, with Colombia focusing specifically on multimodality. Meanwhile, Belize plans to consolidate its fleet of hybrid waterway vessels. Table 11 presents these proposals in greater detail for each country with an LTS.

Measures for non-motorized transport

Of the eight countries with a LTS for transport, six include proposals for non-motorized modes such as cycling and walking, for example promoting dedicated paths and the development of more compact cities. Costa Rica, for example, has plans to increase non-motorized travel by 10 percent by 2050. While Belize and Colombia have proposals to increase trips by bike, they have no measures to support the pedestrian mode in their LTSs.

The region also prioritizes the generation of plans and public policies to encourage modal shift and sustainable urban mobility. The countries promote intermodality between non-motorized modes and public transport to reduce the number of trips in private vehicles. For example, Chile's LTS prioritizes sustainable urban mobility by considering the needs of pedestrians and non-motorized modes in the planning of inclusive transit-oriented cities. Table 12 shows the areas of focus in the LTSs for non-motorized transport, by country.

Table 11. Summary of LTS activities related to low-emission freight transport in LAC, by means of transport and country

	Low-emission propulsion technologies			Fleet renewal			Energy efficiency and biofuels			Institutional and regulatory			Infrastructure and logistics				Total			
# countries with actions	4	1	1	2	0	0	3	0	0	4	1	1	2	0	1	2	8	2	3	2
Argentina										1	1	1					1	1	1	
Belize			1							1							1		1	
Chile	2																2			
Colombia	3			1			2						1		1	1	7		1	1
Costa Rica		1					1									1	1	1		1
Guatemala										1							1			
Mexico	1			1			2			1			1				6			
Uruguay	2																2			
# Total actions	8	1	1	2	0	0	5	0	0	4	1	1	2	0	1	2	21	2	3	2

Road Rail Waterways Logistics Intermodal

Source: Authors' own work based on updated LTSs available on the UNFCCC website.

Table 12. Summary of LTS activities related to non-motorized transport in LAC, by means of transport and country

	Low-emission propulsion technologies		Institutional and regulatory		Infrastructure		Modal shift	
	Bicycle	Pedestrian	Bicycle	Pedestrian	Bicycle	Pedestrian	Bicycle	Pedestrian
# countries with actions	1	0	2	2	2	2	1	0
Belize							1	
Chile			3	2				
Colombia	1							
Costa Rica					1	1		
Guatemala			1	1				
Mexico					1	1		
# Total actions	**1**	**0**	**4**	**3**	**2**	**2**	**1**	**0**

Source: Authors' own work based on updated LTSs available on the UNFCCC website.

3 Progress on implementation and identification of best practices

3. Progress on implementation and identification of best practices

This chapter presents a comprehensive analysis of the progress made on implementing the activities contained in NDCs for the transport sector. It covers the 20 countries that have transport proposals in their NDCs. The analysis considers four modal categories: public transport, light vehicles, freight transport and non-motorized transport. In addition, this chapter analyses the progress of four countries whose plans and actions are considered an example of good practice in terms of achieving the emission reduction goals set.

So far, this report has referred only to commitments that are officially established in the NDCs. It has not considered any actions that are not presented in the NDCs. However, the various countries may also be planning and implementing strategies and actions focused on other category types not mentioned in their NDCs. A recommendation is therefore that countries use their NDCs to encompass the full range of national actions taken, so that it serves as an instrument for communicating the parties' ambition at international level.

3.1. Current situation of all the countries analysed

This analysis is based on interviews with environmental, energy and transport authorities in each country and on reviewing official secondary sources. It examines the following categories: public transport, freight transport, light vehicles and non-motorized transport. Each country was ranked according to its progress in each modal category, using the following stages:

- **Operation:** Activities or projects are fully underway to fulfil an NDC commitment.
- **Partial operation:** Limited pilots or projects are underway, designed to test the strategies proposed.
- **Implementation:** Initiatives are being deployed, with established contracts or secured funding.
- **Set-up:** Initiatives are in the technical, technological, legal and/or financial design stage.
- **Planning:** Initiatives are in the preliminary stages; they have not been formally set up but there is a government team working on them.
- **Not applicable:** The country's NDC does not include actions for the modal category under consideration.

The report also presents a more detailed analysis of four countries selected as examples of good practice (Chile, Colombia, Mexico and Uruguay). This describes the scope of the activities in the countries' NDCs related to low-emission transport and analyses their progress. This analysis is based on primary data collected from interviews with the environment, energy and/or transport authorities of each country. It also draws from official secondary sources regarding the progress of the various initiatives.

3.1.1. Actions related to public transport

The introduction of electric buses to reduce emissions is one of the most common proposals in the NDCs of LAC countries. However, progress on this action is limited: only three countries have made significant progress, with the rest behind schedule. Chile, Colombia and Mexico lead the field, together accounting for 68 percent of the electric fleet in operation in LAC. However, these vehicles still only represent between 4 and 13 percent of the operational bus fleets in these countries' main cities. Uruguay has

also made some progress, putting into operation a limited number of electric buses through innovative financing and subsidy schemes. This achievement offers valuable lessons for the financial framework, in relation to the incorporation of electric fleets and the refocusing of fuel subsidies. Guatemala, too, is moving forward, having incorporated 24 electric buses into Guatemala City's BRT system.

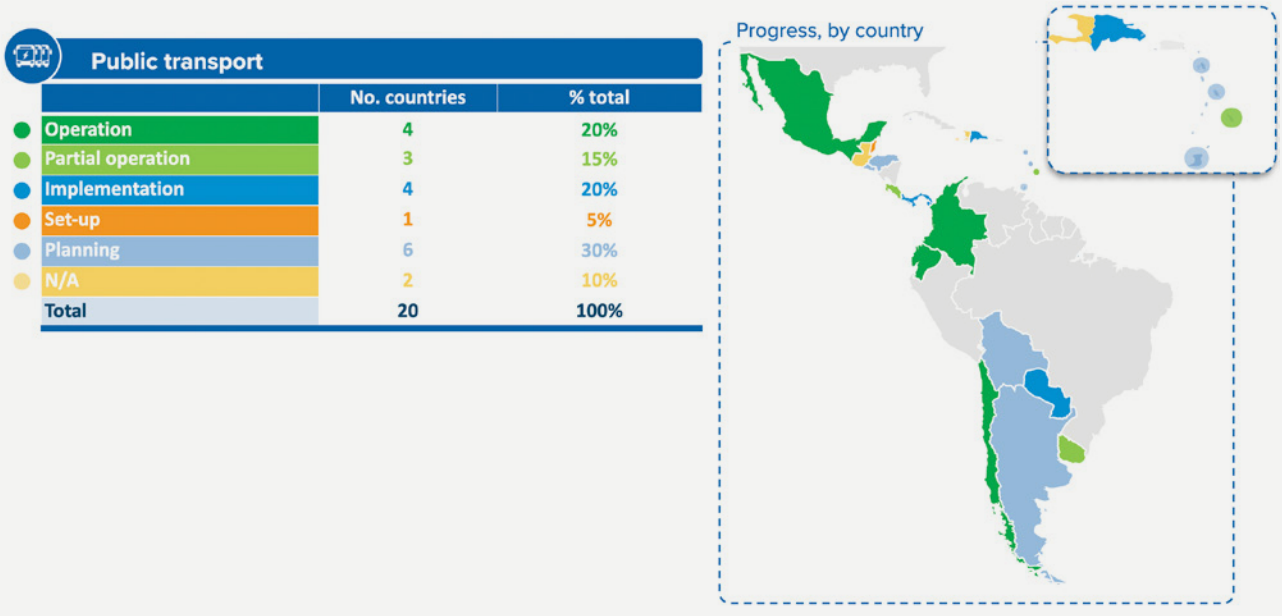
Conversely, countries such as Belize, Costa Rica, Paraguay and Trinidad and Tobago are at a less advanced stage. They have structured pilot schemes to test the technical and technological operation of electric fleets as part of the actions defined in their NDCs. In the remaining countries there is evidence of some progress on regulatory frameworks, tax incentives or system planning, but no relevant substantive results in terms of having operative electric bus fleets. Figure 16 presents each country's progress on implementing actions related to public transport.

Countries that have not yet implemented their initiatives to introduce low-emission fleets into public transport systems can learn from the countries that have made the most progress. Chile, Colombia and Mexico have valuable experiences to share relating to the operation of electric vehicles, technical framework, roll out of charging infrastructure, partnerships between governments, transport operators and energy companies, fleet contracting and operation modalities, financing models, and estimating capital and operating expenditures (CapEx) and (OpEx) for electrified transport systems.

In addition to electrification strategies, **countries propose to incorporate buses that run on natural gas or hydrogen, but only limited progress has been made in this area.** Colombia stands out for its renewal of the TransMilenio fleet in Bogota, where it has upgraded all the buses to Euro 5 or higher, or to natural gas vehicles. Argentina, which has access to vast natural gas resources, has so far only produced an energy transition plan in which natural gas vehicles will enter the public transport fleet. The country's economic problems have slowed the progress of this plan. Chile and Colombia are setting up pilots with hydrogen buses, but the high cost of this technology suggests it will be some time before these vehicles are widely used in LAC.

The implementation of tax incentives, together with innovative financing schemes, is essential to supporting the acquisition of low-emission fleets. Uruguay's experience in this area is noteworthy. It has

Figure 16. Progress by country on the implementation of public-transport-related actions



Source: Authors' own work based on the UNFCCC Registry and the study of each country's NDC.

set up a fund to finance the acquisition of electric buses in Montevideo, with the aim of renewing 4 percent of the fleet. Costa Rica has conducted studies to evaluate financing schemes for electrified public transport and has introduced a law to guarantee a differential price for electricity used to charge public transport buses.

Of the five countries that propose actions related to implementing rail systems for passenger transport, only Ecuador, Mexico and the Dominican Republic have shown significant progress. Ecuador has put into operation the Quito Metro and the Cuenca Tramway. The Dominican Republic is moving forward with the construction of a new subway line, scheduled for completion by the end of 2024. Mexico is making progress on the construction of thousands of kilometres of passenger and freight railways; it expects that much of the planned work will be finished before 2030. Conversely, Costa Rica and Paraguay have not reported significant progress on their rail projects.

There is evidence of efforts in LAC to incorporate the GESI perspective in both project set-up and operation. However, this requires the building capacities, allocation of funds and launch of initiatives to support these efforts. Colombia, Guatemala and Uruguay are some of the countries with outstanding initiatives to promote gender equality in public transport. In Colombia, La Rolita, a public transport operator within Bogota's Integrated Public Transport System (SITP), has hired 450 women as electric bus drivers. Guatemala is implementing the introduction of 24 electric buses for a line operated entirely by women. In Uruguay, subsidies for electric fleets depend on the implementation of gender equality programmes by transport operators.

3.1.2 Actions related to freight transport

The implementation of LAC NDC actions for road freight transport involving fleet renewal, the use of alternative energies and improving energy efficiency is significantly behind schedule. This delay highlights the challenges of managing this type of project, which stem from the sector's characteristics.

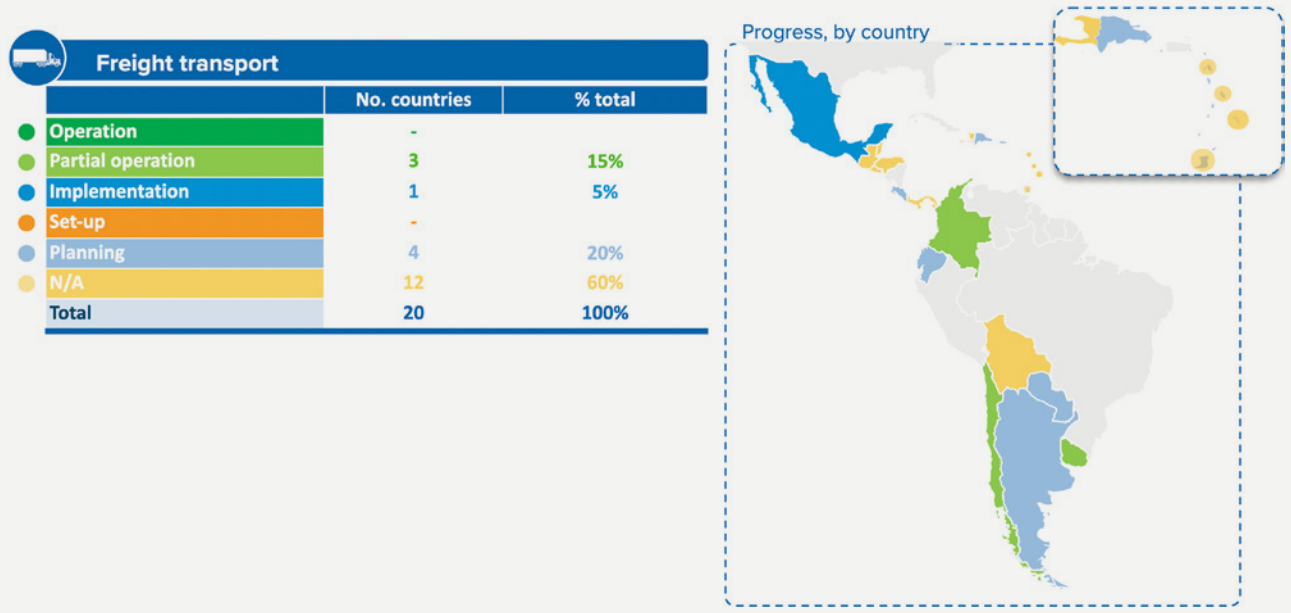
Five countries propose in their NDCs to incorporate low-emission solutions in urban logistics. Two of these five countries have made partial progress on this measure. However, the penetration of low-emission light trucks in LAC is still very limited. Chile has made progress with its '*Electrologística*' (Electrologistics) pilot scheme in Santiago and Concepción. In addition, it has deployed 87 light electric trucks and promotes energy efficiency with the '*Giro Limpio*' (Clean Turn) programme. Uruguay has implemented the '*Plan de Flota Verde*" (Green Fleet Plan) for companies, as part of the '*Movés*' (Efficient and Sustainable Mobility) project, and has 295 electric utility vehicles and 51 low-emission last-mile trucks.

Other countries are at less advanced stages: Guatemala and Costa Rica have carried out electric mobility pilots for urban logistics, while Paraguay has only made progress on planning, establishing priority strategies and measures in its '*Plan Maestro de Movilidad Eléctrica para Transporte Público Urbano y Logístico*' (Master Plan for Electric Mobility for Urban Public Transport and Logistics). Figure 17 presents this progress in more detail.

Argentina and Colombia set targets in their NDCs for the renewal of their heavy goods fleets. Colombia has made greater progress in terms of the total number of units replaced. It has upgraded 28,000 heavy goods vehicles to Euro 6 through its Freight Vehicles Modernization Programme ('*Programa de Modernización de Vehículos de Carga*'). Argentina, which has the second-largest reserves of unconventional gas in the world, is focusing its efforts on renewal based on a transition to this type of fuel. In 2022, the Ministry of Transport and Argentina's national gas regulator, ENARGAS, signed an agreement to promote the transition to gas in freight transport. While Mexico does not mention this type of initiative in its NDC, it has committed to renewing its cargo fleet under the US-Mexico-Canada Agreement (USMCA).

Of the four countries with NDCs focused on energy efficiency in freight transport, Argentina and Colombia have made progress in this area. While Colombia has taken steps to upgrade vehicles to Euro 6, it has not implemented formal programmes for route optimization or vehicle occupancy optimization. Argentina has set up the Smart Transport Programme ('*Programa Transporte Inteligente*'), a public-private partnership to promote energy efficiency, particularly in freight transport. Participation in the partnership is voluntary; it comprises transport companies, freight

Figure 17. Progress by country on the implementation of freight transport actions



Source: Author's own work based on the UNFCCC Registry and the study of each country's NDC.

generators, trade associations, technology providers, academia and government representatives.

The countries with NDC initiatives on using biofuels in freight transport have established laws on the maximum percentage of these fuels in the blend, with plans to increase this percentage by 2030. However, their use is not mandatory, and they have not been widely adopted due to transporters' concerns about their energy efficiency. Colombia permits up to 10 percent biodiesel in blends, and Guatemala has conducted successful pilots with 10 percent ethanol in blends. Both countries expect to make these blends mandatory in the near future. In Paraguay, the law establishes that the blend must contain a maximum of 5 percent biofuels and it is expected that this percentage will increase to 7.5 percent in line with the NDC target. One NDC goal established by Honduras is to promote the generation of biofuels and biogas in order to incorporate them into the fuels used in the country. Uruguay also aims to increase the percentage of biofuels in blends, with a target of 11 percent bioethanol in blends by 2030.

In LAC there are still no operational initiatives on green hydrogen in freight transport, but Chile, Costa Rica and Uruguay have made some progress towards this goal. Chile and Costa Rica have developed national green hydrogen strategies with roadmaps for the transition. Uruguay has a roadmap to 2040 and has approved the first heavy goods transport project to be financed through its Green Hydrogen Sectoral Fund.

In intermodal transport, of the five LAC countries that have NDC commitments to revitalize rail and waterway transport, most are at the stage of reviewing options and setting up initiatives. Mexico has made the most progress of the five countries. It currently has several railway construction projects underway, for freight and for passengers. In Colombia, the La Dorada–Santa Marta rail corridor is being set up, as is the *Tren Limonense de Carga* (TELCA), a freight trainline, in Costa Rica's Limón region. Argentina, which proposes in its NDC to renew its waterway fleet with alternative energies, has not yet received feedback from local representatives about progress on this front.

Given the long set-up and construction periods needed for these rail transport projects, and the need for significant investments, it is important to push for speed and greater ambition in these initiatives. In the case of Argentina, even if the design process begins in 2024, meeting its commitments by 2030 will not be feasible.

Colombia and Costa Rica are the only LAC countries to establish specific commitments on sustainable logistics at ports, urban areas and/or freight centres. To date, Colombia has focused on conducting studies to optimize intermodal logistics, but has not launched any operational initiatives or implemented nighttime loading and unloading in urban environments. Costa Rica has not yet implemented any sustainable logistics models, but it expects to have some initiatives in place at ports, urban areas and logistics consolidation centres by 2025.

Four countries refer to the regulatory/institutional component of freight transport in their NDCs, but none have launched corresponding initiatives on the ground. Argentina has completed its National Climate Change Adaptation and Mitigation Plan, but has not yet designed its investment plan for freight and passenger rail transport. The Dominican Republic is currently structuring its National Vehicle Inspection programme, which has already been shared with stakeholders. Uruguay has developed its Green Hydrogen Roadmap, but has not yet put in place the regulations and associated incentives to promote this energy source, which it hopes to do by 2030. Finally, Ecuador has focused on passenger transport initiatives and has not made tangible progress on regulations or plans related to freight transport.

Progress towards NDC commitments on freight transport in LAC is insufficient to achieve the goals set for 2030. Only nine countries propose initiatives to reduce emissions in this sector, focusing on fleet renewal, electrification of urban logistics, use of green hydrogen and improved energy efficiency. Progress is limited, with many countries behind schedule, and it is clear that unless comprehensive and ambitious measures are implemented with significantly greater momentum, NDC commitments are unlikely to be met.

The main barriers and gaps that these countries face include a lack of adequate financing, an insufficient incentives framework, and the scarcity of affordable emerging technologies. Countries such as Argentina and Colombia have made progress on renewing their heavy goods fleets, which are old and not energy-efficient. However, the structure of these fleets has not fundamentally changed, probably because the economic incentives are insufficient to persuade owners to upgrade. Although some countries, such as Chile and Uruguay, have initiated pilot programmes and adopted incentives for the electrification of light trucks, the penetration of these vehicles remains very low because transporters perceive that operating combustion vehicles is still more profitable and because the mountainous topology of many LAC cities hinders the widespread use of electric light trucks. Another emerging technology is hydrogen-powered heavy goods vehicles, but this will not be financially viable in LAC in the short term. In the meantime, the region should begin to introduce strategies in its NDCs related to the use of biofuels and natural gas vehicles in heavy goods transport for quick wins on mitigating GHG emissions.

3.1.3. Actions related to light vehicles

The NDCs of 14 countries mention expanding their low-emission car fleets, but progress has been limited and the measure will not significantly reduce emissions in the near future. The penetration of electric vehicles remains below 1 percent in all 14 countries. For some countries, intermediate targets for electrification were much higher, at between 8 and 60 percent, yet of these countries Costa Rica had just 8,800 electric cars by 2023, Chile 3,782, Colombia 4,741 and Uruguay around 4,000. For other countries, such as Guatemala and Panama, the figures are even lower. Among the countries that had proposed that by 2030 all new vehicles sold should be low-emission, only Barbados reports some progress, with 17 percent of all imported vehicles in 2022 being electric. Antigua and Barbuda and the Dominican Republic do not have a significant low-emission fleet.

Progress has also been slow in the 11 countries that included commitments on the incorporation of low-emission taxis. Between 2021 and 2022, Chile financed the purchase of around 230 low-emission taxis under the My Electric Taxi (‘*Mi taxi eléctrico*’) programme, but this is a small fraction of the total taxi fleet. In Colombia, cities such as Bogota supported the purchase of 48 electric taxis as part of a pilot project. Although the initiative has continued beyond the pilot, it has not resulted in a general acceptance of this type of vehicle by taxi owners. Finally, Uruguay’s taxi fleet has just 100 electric taxis.

Initiatives to electrify motorbike fleets have also seen little progress. Consumers show a clear preference

for economical combustion engine motorbikes, which they have begun to see as a more attractive alternative to public transport. In Colombia, only 1,400 of the more than 11 million motorbikes are electric. In early 2023, Costa Rica had only 1,059 electric motorbikes, while in Paraguay penetration remains very low, despite the existence of a fund to finance EV purchases, including motorbikes.

The high cost of acquisition and the lack of charging infrastructure have been the two main obstacles to the transition to electric and self-charging hybrid vehicles, including taxis and motorbikes, in LAC. The current cost of EVs (which start at US$20,000) is very high, given the average purchasing power of consumers in LAC, where GDP per capita is between $3,000 and $18,000 (with the higher figure found in only a handful of countries, such as Chile, Costa Rica and Uruguay). ICEVs remain more affordable and therefore more attractive. Furthermore, in LAC, vehicles are perceived as a long-term investment; for a large part of the population it is not feasible to buy a new vehicle every 10 years, which is the useful life of electric car batteries.

In LAC, the lack of charging infrastructure impedes straightforward journeys for EVs in urban and interurban environments. The International Energy Agency recommends having at least one charger for every 10 EVs. On the basis of a conservative target of 10 percent penetration of EVs in LAC, countries would need to provide two chargers for every 1,000 inhabitants to comply with this recommendation (assuming that only 20 percent of the inhabitants own a vehicle of any type). Currently, no LAC country comes close to this goal. Chile, which is one of the countries that has made the most progress in this area, has barely one charger for every 18,000 inhabitants. This shows the serious, ongoing deficiencies in this type of infrastructure in the region. The shortage is particularly problematic on roads that connect cities very far away from each other.

It should be noted, however, that expanding the fleet of low-emission light vehicles may not be the best way to move towards sustainable mobility. First, electrification does not solve the underlying problem of congestion created by the growing use of private vehicles and motorbikes. Several LAC cities, such as Bogota, Buenos Aires, Mexico City and Santiago, are notorious for congestion, which increases travel times and emissions from idling ICEVs. Second, motorbikes can become a public health problem because of the high number of accidents they cause, as seen in Colombia today. This issue is not resolved by electrification either. Finally, in countries where the national electricity grid still relies on fossil fuels, electrification would not significantly reduce GHG emissions.

3.1.4. Actions related to non-motorized transport

Of the nine countries that include initiatives related to active mobility in their NDCs, four have progressed to the operational stage. In Buenos Aires, the BA Ecobici programme, a free public cycle system, was implemented, with more than 3,200 bicycles, 320 pick-up stations and 200 km of cycle paths spread across 48 neighbourhoods [34]. Chile also has a public cycle system called Bike Santiago, [35] with 2,200 bicycles and 230 pick-up stations, and the Línea Cero scheme [36], which offers cycle parking at subway stations, thus supporting bicycle use for first- and last-mile trips. In Colombia, Bogota has 600 km of active cycle lanes and plans to expand this network even further, as well as 6,000 bike parking spaces in the city's BRT system. It also has a bike-sharing system, designed with a gender perspective in mind, to encourage take-up by women. Medellín has a public cycle system called EnCicla, which has 2,000 bicycles and is integrated with the city's public transport system. In Mexico City, the Ecobici public cycle system has 9,300 bicycles and 687 pick-up stations, making it one of the largest systems in the region.

At a slightly less advanced stage are El Salvador, which has established a Cycle Path Master Plan for the construction of 166 km of cycle lanes in the country, and the Dominican Republic, which has recently opened some cycle path circuits in Santo Domingo, the capital.

While the four countries that have progressed to the operational stage are doing well, the other countries in the region need to strengthen their efforts to promote cycling to ensure truly sustainable mobility in their cities. The main barriers hindering the uptake of bicycles as a means of transport in LAC are the lack

of dedicated infrastructure and the lack of resources to build it (with available resources in many cases spent on maintaining the road network for motorized transport); the poor road safety that puts the most vulnerable road users, i.e. cyclists, in danger; and the high levels of citizen insecurity in many cities, with cyclists frequently being robbed. These barriers have a greater impact on women than men, resulting in fewer women cycling than men. The gender gap is therefore another barrier that slows cycling uptake.

LAC countries should prioritize walking, cycling and the use of public transport, as it is only by transitioning to these means of transport that we will see a significant mitigation of GHG emissions. Only nine of the countries analysed include measures on cycling in their NDCs, and only seven promote walking. Instead, countries' efforts are concentrated on electrification of cars, which is costly and does not solve the problem of congestion. Because of the socioeconomic profile of urban populations in LAC, there is high potential demand for bicycles, since they offer a cheap and environmentally friendly means of transport. However, the barriers outlined above, including well-founded fears of road accidents and robbery, prevent city residents from switching to cycling. In general, countries in LAC are failing to address these barriers in their cities and, as a result, are missing an opportunity to capitalize on cycling's popularity as a means of transport.

The pedestrian mode in particular is underrepresented in the various initiatives related to sustainable transport. This does an injustice to urban populations in LAC, given the notably high proportion of pedestrian trips in the modal split of cities in the region. Moreover, although each city has some affluent areas that are exceptions, in general, pavements and paths are not in good condition, which is not conducive to walking, especially for persons with disabilities. Finally, the same issues of poor road safety and citizen insecurity that affect cyclists also affect pedestrians.

It is therefore crucial that the region affords walking the importance it deserves, especially given that all people are pedestrians at some point in the day. Countries must include more ambitious targets in their NDCs promoting the pedestrian mode, to incentivize a modal shift to a truly sustainable means of transport and achieve GHG emission mitigation targets by 2030.

3.2. Progress by country

This section examines progress made on implementing the measures proposed in some emblematic NDCs in the region, as a key indicator of overall progress in this sector. This analysis is based on interviews with industry experts. It does not evaluate countries' monitoring mechanisms (via measurement, reporting and verification [MRV]) of their NDCs.[9] It prioritizes feedback from people on the ground about how the actions proposed in the current NDCs have been implemented. These interviews and analyses do not cover all the initiatives contained in the NDCs, although in some cases it identifies actions on the ground that broaden the level of ambition of the NDCs, but which are not expressly stated in them. This situation presented an additional challenge.

Another challenge for this analysis was that some NDCs (e.g. those of Chile and Panama) are structured differently and therefore do not report specific activities for the transport sector in the form of official commitments, but as non-binding measures in hypothetical medium- and long-term modelling scenarios. In theory, this approach allows changes to modelled measures and actions if more efficient methods are found, but it also means that there are no official binding goals for specific transport sector activities to be met by 2030, making it difficult to objectively measure these countries' progress on implementing their NDCs. Nonetheless, for the purposes of this analysis, measures from these modelled scenarios have been included in the tabulation of targets by country and sector.

9 MRV systems for the transport sector in LAC are in their infancy in most countries, and it is expected that the Biennial Transparency Reports (BTR) will improve this source of information from 2024 onwards.

3.2.1. Chile

Mitigation target

Chile's NDC includes two unconditional targets for GHG and black carbon emissions mitigation. In the first, it commits to a GHG emissions budget of no more than 1,100 $MtCO_2eq$ in the period 2020–2030, a peak of emissions in 2025, and a goal of 95 $MtCO_2eq$ by 2030.

In the second, it commits to reducing total black carbon emissions by at least 25 percent by 2030 compared to 2016.

Chile does not commit to binding transport sector actions in its NDC. Instead, it presents two modelling scenarios: a baseline scenario and a carbon-neutral scenario. In these scenarios hypothetical actions are reported for the medium- and long-term (2040 and 2050), designed to guide the country's next steps, but they cannot be considered a formal commitment.

Chile's LTS does present concrete targets for the transport sector that are in line with the scenario modelling in the NDC. However, the role of LTSs is to guide future NDC updates, and so assessing compliance with these strategies is beyond the scope of this analysis.

Given these constraints, this analysis has taken the modelling scenario guidelines used in the preparation of Chile's NDC as a baseline. Although these guidelines are not binding, they do indicate the ambition needed in the work Chile is doing to progress towards its mitigation goals. In addition, although it is not part of its NDC, Chile has a National Electromobility Strategy, [37], which establishes concrete targets for low-emission transport for 2035, 2040 and 2050.

Progress on public transport actions

Modelling scenario: An electric fleet is incorporated into public transport in the Santiago Metropolitan Region and other regions of the country.

Chile is at a fully operational stage in the electrification of public transport, especially in Santiago, which has the largest electric fleet in LAC. However, penetration of electric buses in the country is limited. Chile has 2,446 electric buses (as at 2023), of which 2,267 are in the Santiago Metropolitan Region, 74 in Valparaíso, 42 in La Serena and 40 in Antofagasta. Electrification will continue as the concession holders of the Metropolitan Mobility Network renew their fleets, in line with the commitment made in the NDC. Chile has also been preparing to launch a pilot scheme for a green hydrogen-powered bus.

Progress on light vehicle actions

Modelling scenario: electrification of private and commercial vehicles

In Chile, initiatives to incorporate low-emission light vehicles have reached partial operation stage, with the legal and regulatory framework and taxi renewal programmes now in place. However, the high cost of electric vehicles remains a significant barrier.

In 2022, Chile had 3,782 light electric vehicles, more than 28,000 hybrids and 879 public charging points. Although these figures are high for LAC, they still represent only a small proportion of the total vehicle fleet (the NDC target suggests there should be millions of these vehicles). The Electromobility Law (Law 21505 of 2022) promotes the development of energy storage systems and electromobility, allowing EVs and EV charging stations access to the electricity distribution network, injecting or extracting energy through a net-billing scheme. This provides financial flexibility to EV owners and EV charging station providers. Thanks to this law, EVs and HEVs were exempted from road tax for two years, from 1 February 2023 onwards. At the end of that two-year period, a tax will apply, rising gradually until 1 February 2031, when the full rate will be charged for both types of vehicles. Chile has also approved regulations for the safety of electricity consumption facilities, the implementation of charging infrastructure and interoperability at charging stations.

Fossil fuels predominate in Chile's primary energy mix, accounting for 64 percent of the total [38]. It is therefore crucial to understand the impact that widespread use of light electric vehicles will have on energy demand and GHG emissions in the country, given that energy will largely be generated from non-renewable sources. The electrification of the light vehicle fleet will only

significantly mitigate emissions if Chile achieves an energy mix that is dominated by low-carbon sources of energy.

Modelling scenario: gradual electrification of the taxi fleet

The My Electric Taxi programme financed 50 vehicles in 2021 and aimed to expand the fleet to 180 in 2022, with electric taxis operating in Valparaíso, the Santiago Metropolitan Region, Biobío, Los Ríos, Araucanía and Aysén. The *'Renueva tu Colectivo'* (Upgrade your Colectivo) programme [39] promotes the renewal of the shared-taxi (*colectivo*) fleet, through financing campaigns offered by each regional government to help the vehicles' owners upgrade to an EV or HEV. To give some specific regional examples, 27 percent of shared taxis (954 vehicles) had been upgraded in Biobío by 2023, to vehicles with lower-emission technologies; 69 shared taxis were upgraded in Atacama during 2022; while 91 were upgraded in Maule and 47 in Ñuble during 2023 alone. By 2023, this programme was offering subsidies ranging from $2,200 to $6,100 for HEVs and $9,600 for EVs [40]

Progress on freight transport actions

Modelling scenario: Chile seeks to make green hydrogen the primary energy source for heavy goods vehicles in the future.

Chile has secured significant funding for its initiatives focused on making green hydrogen a major energy source for freight transport and is now setting up these initiatives. Thanks to its natural resources, there is great potential in this country to migrate to green hydrogen (which requires a combination of abundant water and renewable energy) as an energy source for transport. However, the country has so far been in the planning stage, developing plans while facing uncertainty about how to scale this technology. Chile has a comprehensive National Green Hydrogen Strategy, aiming to be a world leader in production and consumption by 2040. Additionally, it has created a Fund for the Development of Green Hydrogen and its Derivatives, with the objective of stimulating local demand, establishing a domestic market and building national production capacities. The programme has an initial investment capacity of $1 billion, with the aim of leveraging a total investment of $12.5 billion, and will be funded with loans and contributions from international organizations and the European Union, plus additional resources from the Production Development Corporation.

Modelling scenario: electrification of private and commercial vehicles.

Chile is partially operating the initiatives focused on electrifying intra-urban freight transport. In 2022, Chile had 87 electric trucks for urban use. Furthermore, it has piloted electric trucks in Santiago (seven vehicles) and Concepción (four vehicles) through the *Electrologística* logistics project, which assessed costs and operational results with light trucks provided by importers. Operating with these vehicles proved to be financially attractive and the participating companies rated the experience as positive. Some of them have decided to evaluate partial transition to electric trucks.

Progress on non-motorized transport actions

Modelling scenario: the use of private motorized transport is planned to be reduced, migrating to buses and bicycles

In Chile, initiatives to promote active mobility are at an operational stage. In Santiago, public cycle rental systems have been implemented for residents and visitors. The city has "Bike Santiago" [35] with 2,200 bicycles and 230 stations in 14 municipalities, in addition to the "*Línea Cero*" (Line Zero) programme [36] with 26 cycle parking stations, for easy integration with subway lines, with plans to expand to 103 stations by 2024.

3.2.2. Colombia

Mitigation target

In its NDC, Colombia's unconditional emissions mitigation target includes reducing GHG emissions to 169.44 $MtCO_2$-eq in 2030, a 51 percent reduction from the baseline scenario, and reaching peak emissions between 2027 and 2030. In addition, it aims to reduce black carbon by 40 percent by 2030 compared with 2014.

Colombia's NDC stands out for its targeted initiatives and the specific breakdown of each activity's contribution to the committed reduction in omissions. This NDC is an example of good practice. However, such specific binding commitments could limit flexibility to adopt low-emission mobility pathways that prove to be more efficient along the way.

Progress on public transport actions

NDC goal: To register 600,000 EVs by 2030, covering public, private and freight transport.

Colombia has deployed fully operational initiatives to electrify public transport, particularly in Bogota, which has one of the largest electric bus fleets in the region. However, there is still a limited number of electric buses in the country.

Colombia has been focusing on public transport systems to lead the energy transition. To date (July 2023), Bogota has 1,486 electric buses, while Medellin and Cali have 69 and 35 respectively. Electricity supply and charging network alliances have been formed with Enel X in Bogota and Celsia in Cali, with nine bus charging yards and 698 dual charging stations. Villavicencio and Tunja are also planning electric public transport systems, with goals of 100 percent and 30 percent electric buses respectively. In addition, **Law 2099** of 2021 exempts mass public transport operators from paying the *'contribución solidaria'* energy tariff for charging electric buses, allowing savings of up to 20 percent in electricity costs. In 2023, Bogota launched a pilot with the country's first hydrogen bus, with a potential reduction of 1,083 tonnes of CO_2 per year, according to the Environment Secretariat.

Progress on light vehicle actions

NDC goal: Register 600,000 EVs by 2030, covering public, private and freight transport.

Colombia is in partial operation stage for light vehicle electrification. While there is progress and there are a number of EVs in the country, they still make up a tiny part of the fleet on the roads. In 2022, there were 4,741 EVs, 36,219 HEVs and 1,400 electric motorbikes. The factors that have limited their mass adoption are high acquisition costs and the lack of public charging stations (only 210 charging points in the country). It was a strategic decision to exclude HEVs from the NDC, as they generate more emissions than EVs according to Colombia's energy mix: a plug-in HEV emits 139 gCO_2-eq/km, while an EV emits 75 gCO_2-eq/km, mainly due **to** its 68.4 percent hydraulic generation **versus** 30 percent thermal generation.

Colombia's National Electric Mobility Strategy (ENME) establishes four action points to accelerate the transition: develop regulatory and policy instruments, economic and market instruments, technical and technological instruments, and infrastructure and territorial planning conditions. The aim of this is for more EVs to be registered than ICEVs by 2038. Moreover, the Electric and Low-Emission Vehicle Law (Law 1964 of 2019) and Decree 2051 of 2019 offer economic incentives to make it easier to buy electric and low-emission vehicles, including a reduced VAT rate of 5 percent, a property tax of 1 percent, and zero tariffs. In addition, EVs have special rates for annual MOT tests, access to preferential parking and are exempt from mobility restrictions in cities. It also highlights Resolution 40223 of 2021 of the Ministry of Mines and Energy, which establishes minimum standards for EV charging infrastructure.

Progress in freight transport actions

NDC Goal: Renew 57,000 heavy vehicles (gross mass greater than 10.5 tonnes) between 2015 and 2030, replacing each retired vehicle with a Euro 6 standard vehicle and reducing fossil fuel consumption.

By 2022, more than 22,000 heavy freight vehicles had been renewed under the "Freight Vehicle Fleet Modernization Programme", an initiative that is now in a fully operational stage. This programme is one of the strategies to mitigate GHG emissions in Colombia's NDC, governed by Resolution 0005304 of 2019, offering an economic incentive to owners who wish to replace an old truck or tractor-trailer with a new one. The incentive varies between $14,000 and $28,000, depending on the vehicle's gross mass and number of axles (the exact value can vary depending on the exchange rate and annual inflation). The incentives

are 100 percent for scrapping with no replacement, 70 percent if replaced with a low-emission vehicle (electric, hybrid or natural gas) and 60 percent if replaced with another diesel vehicle. In addition, the programme offers a 15 percent exemption on registration tax for new freight vehicles.

The fleet modernization process will not completely eliminate the use of fossil fuels in the short or medium term. For this reason, Resolution 40447 of 2022 gives authorization for fuel for freight transport to contain 10 percent biodiesel, in line with what is stated in this NDC on the reduction of fossil fuel usage. There are also programmes in Antioquia and Cundinamarca for voluntary use of blends with up to 20 percent biofuels. Although they are not part of the NDC, these types of measures mitigate GHG emissions from the transport sector and could be included in future updates.

NDC Goal: Rehabilitate the "La Dorada-Chiriguana-Santa Marta" corridor to transport 4.2 million tonnes of freight per year.

The "La Dorada-Chiriguana-Santa Marta" rail corridor project is currently being in set-up phase. This corridor connects the centre of the country with the Caribbean Sea. It is active but its cargo capacity is underutilized. Barely 89,000 tonnes were transported during 2022. Its operation and maintenance are managed by a private consortium, while the government is structuring a public-private partnership to fully renovate the corridor.

NDC goal: Move 8 million tonnes through the Magdalena River annually, ensuring the dredging activities required to maintain navigability.

The public-private partnership for the navigability of the Magdalena River is on hold while the government develops a new operating model, which is in the set-up stage. By 2021, this partnership was technically, legally and financially set up with support from the multilateral bank. However, in 2023, the government decided to evaluate a public model, stating that it would allocate state resources to purchase and deploy dredgers at strategic points along the river.

NDC Goal: Improve logistics operations at supply centres by optimizing freight and vehicle usage, distributing urban freight at night, reducing fuel use by optimizing routes, and implementing transport management systems for operational optimization.

This package of initiatives is currently being set up, and studies have been initiated to strengthen intermodality in freight transport and improve logistical efficiency. The National Planning Department is spearheading these studies in order to design strategies to promote intermodal transport using combinations of rail, inland waterways and roads. It also seeks to improve logistics efficiency at sea and inland waterway ports, as well as at rail and road hubs, by optimizing the management of machinery, available space, storage, movement of goods, and processes for loading and unloading. On the other hand, no specific programmes relating to overnight freight delivery in urban environments have been observed.

Progress on non-motorized transport actions

Colombia has two NDCs related to active mobility:

NDC goal: Increase use of bicycles by 5.5 percent in NAMA TAnDem (NAMA for Active Transport and Demand Management) participating cities.

NDC goal: Decrease the use of vehicles such as cars, taxis, buses and motorbikes with shorter trips that can be made using non-motorized means NAMA DOT cities.

In Colombia, initiatives promoting non-motorized transport, i.e. walking and cycling, are in an operational stage. Bogota stands out for its active mobility, with 600 km of cycle paths as of 2023 [41] to which 560 km will be added according to the Land use Plan 2022–2035 [42]. The city has more than 6,000 bicycle spaces at TransMilenio stations, aiding integration with public transport at no additional cost and promoting the use of non-motorized transport modes for first- and last-mile trips. In 2019, bicycle trips increased by 44 percent compared with 2015, with 880,367 daily trips [43]. Medellin has also made progress with its "*EnCicla*" public cycle system. By 2023, it had 69 stations in Medellin and 42 in five other municipalities of the Metropolitan Area of the Aburrá Valley [44], with over 128,000 people registered and almost 2,000 bicycles. "*EnCicla*" has grown significantly since it started, with 105 bikes and six stations a decade ago [45].

Incorporation of GESI perspectives

NDC goal: In its NDC, Colombia commits to integrate gender in a cross-cutting matter into public policy and to create sustainable jobs in sectors such as transport, through a strategy for the just transition of the workforce to a low-carbon economy.

In 2022, the CONPES (National Council for Economic and Social Policy) document was published to adopt a national policy on gender equity in six areas: 1) economic autonomy, 2) political participation, 3) health, 4) women free from violence, 5) women, peace and security, and 6) state bodies/institutions. From 2022 to 2030, the Ministry of Transport will be designing strategies to prevent and punish violence and harassment against women in public spaces and on transport. Likewise, the National Roads Institute will update the infrastructure guides to incorporate the gender perspective.

As a reference, in Bogota, the public operator of the integrated transport system "*La Rolita*" has prioritized social return and closing gender gaps in the operation of 195 electric buses, with around 450 women trained to get their driver's licence in 2022 (approximately 50 percent of the employed drivers). In addition, in 2020, Colombia made progress on its commitment to green jobs with the Ministry of Environment's publication of the consultancy on the Just Transition of the Workforce, which presents specific proposals to address the just transition in sectors such as transport.

3.2.2. Mexico

Objetivo de mitigación

In its latest NDC update (December 2022), Mexico increased its GHG reduction target for 2030 from 22 percent to 35 percent. The first 30 percent of this reduction is unconditional. It expects to achieve the remaining 5 percent with international support and funding. The unconditional and conditional targets for reduction in black carbon emissions by 2030 are confirmed at 51 percent and 70 percent respectively.

Progress on public transport actions

NDC measure: Consolidate an ENME to meet transport emissions targets, focusing primarily on transforming public transport.

Mexico is consolidating its National Electric Mobility Strategy (ENME), which was published in draft by the National Commission for Regulatory Improvement in 2023. The ENME has the objective of reforming the General Law on Mobility and Road Safety to promote cleaner mobility and encourage the automotive industry to innovate for electromobility. It also takes into account the suitability of the electrical infrastructure and charging stations.

The country has deployed operational initiatives in the electrification of public transport, particularly in Mexico City, although there are still limited electric buses nationwide. In 2023, Mexico had 752 electric buses, 425 of which were Mexico City's Trolleybuses [46] The Trolleybus system has been operational since the mid twentieth century, so it was not initially designed to take into consideration the contemporary challenges posed by climate change. However, these buses have been renewed as part of the country's commitment. In 2019, the fleet was expanded with 23 trolleybuses that included batteries. In addition, Line 10, which operates with 26 articulated trolleybuses running on an elevated viaduct, was launched in 2022. Meanwhile, it is expected that lines 11 and 12, the latter with 28 trolleybuses, will be in operation by 2024. It should be noted that Guadalajara also has 25 trolleybuses, which were modernized in 2015.

In February 2023, 60 electric articulated buses were added to Line 3 of the Mexico City Metrobus system, following a pilot programme that began in 2020 and the addition of nine buses in 2021. This process made it possible to develop technical and financial knowledge, and improve efficiency in the design of BRT buses according to operational needs, reducing battery capacity from 563 KWh to 480 KWh to reduce costs. This is in addition to the energy savings gained from ongoing driver training. Moreover, detailed studies were conducted to ensure the financial sustainability of the project over 15 years, including modifications to Metrobus concessions. Other cities with electric

buses in their public transport are Monterrey (21 buses), Guadalajara (38 buses, in addition to the aforementioned trolleybuses) and Merida (43 buses).

Progress on light vehicle actions

NDC measure: Strengthen energy efficiency regulations for light and heavy vehicles to reduce their carbon footprint and encourage the transition to more efficient vehicles and clean transport programmes.

In Mexico, initiatives to improve energy efficiency and migrate to low-emission vehicles are in partial operation phase. Although this is one of the largest markets for electric and hybrid vehicles in LAC, adoption is progressing slowly. In 2023, HEVs represented 3.8 percent of total light vehicle sales in Mexico, while EVs comprised just 0.96 percent and PHEVs accounted for 0.42 percent. Despite this, significant growth is expected in the coming years, as major manufacturers plan to increase production of EVs in the country. However, Mexico has a low level of electricity generation from renewable sources (just 25 percent), which limits the benefits of adopting electromobility.

NDC goal: Strengthen vehicle energy efficiency regulations, both for light and heavy vehicles, to reduce the carbon footprint of the vehicle fleet, encourage the transition to more efficient vehicles and promote clean transport programmes.

The ENME is not the only measure to improve vehicle energy efficiency. Incentives have been implemented, such as tax exemption for the first five years for new electric cars (plus 50 percent exemption for the ensuing five years), discounts on tolls and reduced electricity rates at home for charging electric cars. NaFin's Sustainable Transport Funding Programme seeks to support the purchase of 1,250 hybrid and electric taxis in Mexico City, in addition to scrapping the same number of obsolete vehicles, offering an economic incentive of between 10 percent and 20 percent of the cost of the new vehicle.

Progress on freight transport actions

NDC goal: Strengthen energy efficiency regulations for light and heavy vehicles to reduce their carbon footprint and encourage the transition to more efficient vehicles and clean transport programmes.

As in the case of cars, initiatives to promote urban freight transport with low-emission vehicles are in partial operation phase. The Sustainable Transport Funding Programme has contributed funding of between 10 percent and 20 percent towards purchasing these vehicles in Jalisco. In addition, electric light trucks are also exempt from tax at national level.

NDC goal: Expand and renovate the national rail network to reduce GHG emissions, for greater energy efficiency when transporting goods and/or people.

Initiatives focused on expanding the rail network are in the implementation stage, with six lines under construction and four works set to begin. Mexico is making progress in renovating and expanding 4,413 km of its rail network, in addition to the 23,731 km in operation. Currently, 1,878 km are under construction in six projects, including the Mayan Train for freight and passengers (1,500 km). In addition, there are five projects yet to be started that will add 961 km, and 1,574 km in projects under consideration. Of these, 1,100 km will be for passengers. According to the 2022 National Rail Programme, these works will be completed soon. While there is no specific commitment in the NDC on the number of kilometres of railway to be renovated, each project will contribute significantly to the 2030 emissions reduction target.

Progress on non-motorized transport actions

NDC goal: Improve the integration of climate change criteria into urban planning, and reclaim public space for pedestrians, while considering a system that is focused on efficient public transport systems, alongside alternative and non-motorized transport systems.

Initiatives that promote active mobility are at an operational stage. For example, in Mexico City, the "*EcoBici*" public cycle system recorded more than 83 million trips from 2010 to June 2023. *Ecobici* surpassed 600,000 monthly trips in 2013. By 2023, it would accumulate more than 800,000 trips per month [47]. In addition, it has 9,300 bicycles and 687 stations, an eight-fold increase since its first year of operation [48].

Progress in demand management

NDC goal: "National Remote Work Strategy" to support workers to carry out their work remotely by capitalizing on the lessons learned from lockdowns during COVID-19.

In Mexico, there is also regulatory progress regarding the promotion of remote work. The Secretariat of Labour and Social Security (STPS) published the Official Mexican Standard NOM-037-STPS-2023 to stipulate health and safety requirements for remote work, providing clear guidelines for workers and companies, with the aim of promoting home-based working to reduce commuting and road congestion.

Incorporation of GESI perspectives

NDC goal: Integrate gender and human rights perspectives into design and implementation, with the participation of subnational, local and city governments, Indigenous People, local communities, civil society organizations, women's and youth organizations, the private and financial sectors, and other stakeholders.

In 2019, Mexico presented the Strategic Gender and Mobility Plan, which has since been improving infrastructure for women's safety on transport. This included improving accessibility, lighting and surveillance in modal transfer centres, establishing exclusive spaces on public transport and adding panic buttons in vehicles and on digital taxi applications. In addition, it seeks to bridge the pay gap between men and women in the transport sector, and reduce the gender gap in bicycle usage.

3.2.4. Uruguay

NDC Objectives

Uruguay's NDC presents absolute mitigation targets for the three main GHGs, committing to not exceeding emissions of 9.267 $MtCO_2$, 0.818 $MtCH_4$ and 0.032 $MtN2_2O$ by 2030, including all sectors of the economy[10]**.** It is important to highlight that, specifically in the case of Uruguay, emissions from the transport sector account for 58 percent of total emissions within the energy sector, according to the GHG inventory carried out by the Ministry of the Environment in 2020 [49].

Progress in public transport actions

Unconditional NDC action: Incorporate EVs and related charging infrastructure by accelerating the availability of fast and ultrafast chargers. In the case of public transport, the fare subsidy for passengers is adjusted to promote zero-emission mobility.

Uruguay has successfully put 31 electric buses into operation in Montevideo, and 5 in Canelones. To further encourage adaptation of electric fleet, a financing fund is being set up in Montevideo to accelerate the acquisition of more EVs to serve the city. In addition, implementation of the "*Subíte Buses*" programme is being planned. This will offer a non-reimbursable grant of $85,000 for acquiring electric fleet for public transport. This programme will play a key role in encouraging the adoption of electric buses and promoting more sustainable mobility in the country.

Regarding charging infrastructure, it is important to note that Uruguay does not currently have a regulatory framework for the interoperability of charging points in public transport. Instead, the existing charging infrastructure is owned by public transport operators and is for sole use by the transport companies. In the years to come, it will be possible to make progress here to enable the public transport fleet to be able to use any charger, thus improving vehicle charging efficiency.

As an example of the country's commitment to low-emission mobility, between 2018 and 2022, Uruguay implemented the "*Movés*" project with support from UNDP and the Global Environment Facility (GEF), which enabled significant progress on sustainable mobility. The project's achievements include acquiring 32 electric buses that replaced diesel-powered buses, signing five agreements for the promotion of electric

10 In addition, there is a target to reduce the consumption of hydrofluorocarbons (HFCs) by 5 percent by 2030, compared to the baseline established based on average consumption for the years 2020 to 2022 in the Industrial Processes and Product Use (IPPU) sector.

buses with public transport companies, and modifying four regulations that contribute to promoting electric mobility.

The Uruguayan Government has established grants for acquiring electric buses, with a fleet renewal target of 4 percent. More recently, in 2024, the government approved a Sustainable Mobility Trust, which reformed the previous Public Transport Trust to further promote the adoption of electric buses by redesigning the current diesel price reimbursement scheme and adding criteria for maximum fleet age, for environmental, energy efficiency and road safety reasons. These advances demonstrate Uruguay's commitment to promoting low-emission mobility through the implementation of policies, programmes and subsidies that encourage the acquisition of EVs in different transport segments.

Progress on light vehicle actions

Conditional NDC measure: By 2030, 30 percent of new light vehicle sales will be EVs.

Sales of EVs in Uruguay have increased significantly in recent years. In 2021, 509 light EVs were sold, representing a five-fold increase compared to the 97 vehicles sold in 2020. However, the number of EVs sold remains marginal as a proportion of total sales. In 2021, EVs accounted for just 1 percent of total sales. By way of example, to reach the 30 percent EV participation target, of the 48,635 light vehicles sold in 2021, 14,591 should be electric [50]

Tax exemptions are currently in effect in Uruguay to promote EVs. The country has green and preferential credits that grant longer payment terms, including insurance and maintenance to encourage people to buy EVs. In addition, Uruguay's state-owned electric power company (UTE) has also played a key role in promoting electric mobility by generating a differentiated hourly rate to reduce costs for owners of these vehicles.

It is important to note that renewable energies cover 97 percent of Uruguay's electricity generation mix, through a combination of hydro (45 percent), wind (32 percent), biomass (17 percent) and solar (3 percent) [51].

Conditional NDC measure: By 2030, the percentage of bioethanol blends in petrol will have been increased to 11 percent.

This measure has made significant progress, since Article 155 of the 2021 rendering of accounts replaces Article 6 of the Agrofuels Law and establishes a minimum of 8.5 percent bioethanol in petrol throughout the country. It is worth noting that sugarcane bioethanol generates a 65.9 percent saving in GHG emissions compared to conventional fossil fuels. For cereal-based bioethanol, savings are 60.1 percent compared to the same type of fossil fuel.

Unconditional NDC measure: Incorporate EVs and related charging infrastructure by accelerating the availability of fast and ultrafast chargers.

UTE has deployed a significant charging infrastructure network throughout the country, installing 250 charging points in three phases that exceeded installation projections by 140 percent of what was initially planned [52] [53]. Additionally, preferential pricing schemes have been implemented for charging taxis, which further encourages their use. Uruguay currently has an operational fleet of 100 electric taxis and 50 light vehicles designed for digital transport platforms.

Conditional NDC measure: The Electric Mobility Plan will be prepared for 2026, to integrate the different lines of action in equipment and infrastructure and align efforts with the Long-Term Climate Strategy.

This measure is currently implemented as of 1 May 2024, and consists of an economic benefit granted by the UTE for charging EVs at the owner's home. This plan creates a monthly invoice discount of $15 from the month of application to December 2025. In addition, the plan offers exemption from the connection fee for new supplies or in the increase of the contracted power associated with the vehicle's load.

Progress on freight transport actions

Conditional NDC measure: incorporation of 600 hydrogen cell-powered freight vehicles by 2030.

Conditional NDC measure: By 2030, regulation capacities and incentives will have been developed as part of implementing the Green Hydrogen Roadmap.

Although there are no hydrogen-powered freight vehicles in circulation to date, Uruguay has been developing various policies to establish a roadmap for the incorporation of this type of freight vehicle. To this end, Uruguay has a Green Hydrogen Roadmap as well as a "Green Hydrogen Sectoral Fund". The main objective of this fund is to provide financing and support for the construction, production and use of green hydrogen in the sector. Its implementation will contribute to promoting the research and development of technologies related to green hydrogen, as well as encouraging those technologies' application in freight transport. This fund has already approved the first project for $10 million, for the generation of green hydrogen for use in heavy-duty transport [54].

In the field of urban logistics, 295 electric utility vehicles have been incorporated. These zero-emission vehicles are used for the delivery of goods, and play an important role in reducing the environmental footprint of freight transport within cities. 51 electric units have been added for last-mile low-emission delivery trucks.

Incorporation of GESI perspectives

NDC measure: Strengthen technical capacities on gender and climate change of at least 80 percent of the gender mechanisms of the three levels of government. Propose establishing training opportunities for retraining/skills training to strengthen competencies associated with green and blue jobs, with a particular focus on the inclusion of women and socially vulnerable populations.

Based on the provisions of Uruguay's first NDC, the country presented the Gender and Climate Change Strategy 2020–2025, which seeks to integrate the gender perspective into climate policies and actions to ensure that women, especially those in the most vulnerable situations, participate and benefit equally from climate change adaptation and mitigation measures.

Another example of this was the development of the "*Movés*" project implemented between 2018 and 2022 to promote a sustainable, efficient and inclusive mobility system. Among the 23 initiatives supported by the project, emphasis was placed on promoting a gender perspective in the public transport sector.

Among the project's actions, four Organizational Diagnoses with a Gender Perspective were implemented in the public transport operating companies that benefited from the project, together with the "*INMUJERES*" methodology (quality model with gender equality). The purpose of this was to reduce gender gaps in transport operating companies in Uruguay and to improve working and service conditions for women.

4 Recommendations for accelerating the implementation of sustainable transport initiatives and fulfilling the NDCs

4. Recommendations for accelerating the implementation of sustainable transport initiatives and fulfilling the NDCs

This section presents a set of recommendations based on this study for accelerating the implementation of actions associated with sustainable mobility and to better channel the efforts of each country towards reducing GHG emissions generated by the transport sector.

These recommendations are structured in line with strengthening the actions defined in the NDCs and LTSs in different areas: for demand management and urban planning (Section 4.1); around transport supply (Section 4.2); and for public and institutional policy (Section 4.3).

4.1. Recommendations related to demand management, urban planning and citizen participation

One of the main conclusions of the analysis, taken as a whole, is that reducing emissions from the transport sector would first be achieved by understanding the social component, with the technological solution only coming afterwards. It is recommended that governments start by clearly understanding demand and work hand in hand with civil society organizations specialized in sustainable transport. It is important, before any technological proposal, to understand what is required in society for the different modes of transport, to fully understand the social barriers or needs, and the cultural context in which a particular measure will be deployed. A low-emission technology will only have an impact if it is applied on a large scale. This also includes strengthening public sector capacity through inter-institutional alliances, including encouraging knowledge transfer between countries. It is also recommended that the public sector establish specialized units to manage and formulate policies in sectors such as sustainable transport and energy transition, with the participation of stakeholders such as young people, academia and the private sector.

It is recommended that the actions needed to reduce GHG emissions generated by the transport sector should be based on a balance between activities related to demand management, urban planning and transport supply. The first two, demand management and urban planning, will make it possible to reduce the number and distance of trips, while the transport supply will enable these trips to be made using more efficient systems based on sustainable transport solutions. This approach can be applied to new projects and future updates of the countries' NDCs and LTSs in the region, to seek a balance between these three areas. This means changing the focus of the second generation of commitments, centred on supply modifications and especially on the incorporation of zero or low-emission fleets.

Planning and management of transport demand and supply requires detailed adaptation to the specific characteristics of each national and urban context. This customized approach ensures that strategies are appropriate, sustainable and beneficial to the local population, thus increasing the likelihood of successful implementation and long-term positive impact. Key factors to consider include:

- The potential of transport supply to mitigate GHG emissions will depend on the resources available at country and city levels. By way of reference, in the case of countries with an energy mix based on renewable energies, it will be more feasible to promote the incorporation of a low-emission fleet based on the use of electricity. However, for islands that depend on fossil fuel-based electricity generation, or where the generation of renewables is at risk due to extreme droughts, other approaches will need to be proposed.
- The density and design of a city influence which urban planning and transport measures will be most effective. High-density urban areas may benefit more from public transport and non-motorized transport options, while expanding cities may require integrated multimodal transport systems.
- Socioeconomic, geographic, climatic and topographic conditions significantly influence the choice of transport solution. For example, mountainous areas may require incentives for different transport modes and technologies compared to flat terrain.
- Cultural relevance and public acceptance are crucial factors in planning transport strategies. Cultural practices influence transport behaviour. For example, cities where cycling is already popular may benefit most from investments in cycle lanes, while others may need to focus on improving pedestrian infrastructure.

This integrated approach allows for the development of transport strategies that not only respond to specific local needs but also maximize their effectiveness in reducing emissions and improving the quality of urban life.

It is essential to address the reduction of GHG emissions by also considering measures to alleviate urban traffic congestion. Congestion causes vehicles to idle or travel at reduced speeds, resulting in higher fuel consumption, increased GHG and pollutant emissions, and lengthen travel times for those using sustainable modes of transport. Migrating to sustainable forms of transport, such as public transport and non-motorized transport, offers a more effective solution, especially in large, congested cities in LAC. In addition, congestion generates significant economic losses that must be considered when selecting transport management solutions.It is key to encourage the optimization of urban commuting by promoting practices such as working from home and flexible travel schedules. The average travel time in major Latin American cities continues to rise, currently averaging approximately 17 days per year in traffic congestion. It is essential to conduct a detailed and specific analysis for each city, rather than applying generalized approaches at national level. Projects such as car-sharing programmes and the promotion of high vehicle occupancy should be evaluated, along with the implementation of laws and public policies that discourage the use of private cars and encourage the transition to more sustainable modes of transport. Annex 2 presents a list of specific measures, referencing cities that were successful in their implementation.

Urban planning is the area with the lowest number of activities proposed in the region's NDCs; it could be developed further through the generation of projects that are developed using TOD methodology. This methodology could foster the transition towards compact cities, as a more sustainable urban development model, accessible to non-motorized transport and with efficient, low-emission public transport. While it is true that the actions created around urban planning are medium-term actions, due to the construction and consolidation times of the urban environments, it could still have a positive impact, not only in reducing GHG emissions but also in the quality of life of citizens once the infrastructure created under the TOD concept materializes. As a reference, Uruguay developed guidelines for sustainable urban mobility planning, to provide tools for local governments to incorporate mobility into the planning of their cities and land use [55].

4.2. Recommendations focused on transport supply

Technological renovation of the existing fleet with low-emission vehicles

Progress in the electrification of public transport in LAC is still limited and concentrated in a few cities. Pioneering cities have created a valuable roadmap that can be replicated in other large cities in terms of overcoming financial barriers, engaging energy distributors and electric bus suppliers in the processes, and leadership and collaborative actions between local and national authorities.

The transition of the transport sector to low-emission propulsion technologies must always consider how energy is and will be generated to power these vehicles over their entire life cycle. LAC has a significant advantage in that 61 percent of its energy mix comes from renewable sources, mainly hydropower [56]. Countries such as Costa Rica, Paraguay and Uruguay stand out for having an energy mix where a high percentage comes from renewable sources, mainly hydropower. In countries such as the Dominican Republic and Trinidad and Tobago, where renewable energy generation is at a low level, it is crucial to carry out a detailed analysis of the alternatives for the transition to low-emission transport, considering its energy efficiency over the use of fossil fuel sources [57].

Conducting pilots to evaluate the feasibility and effectiveness of fleet implementation with different technologies is essential to obtain data under real operating conditions considering social context, geography, technical elements (autonomy, consumption, maintenance). It is important to involve various key stakeholders such as transport operators, local authorities and energy companies in the decision-making process before moving to full-scale implementation. It is essential to promote strategic alliances with the private sector to propose short-term pilots associated with adopting new technologies, mainly considering local production capacities in the region and existing trade agreements that can help to achieve real measures at scale.

In the case of vehicles that are 100 percent electric, it is important to define a strategy to expand and strengthen networks and charging stations for public and private transport. It is essential to authorize and regulate "net-billing" schemes so that EV owners and EV charging stations can inject energy into the grids, as this will be more efficient and reduce costs. By facilitating the injection and extraction of power through this scheme, users will contribute to mitigating energy consumption costs, thus creating an additional incentive to alleviate vehicle operation costs.

It is important that the government establishes which entities will be responsible for the construction, operation and maintenance of electric charging points. Similarly, for charging costs, the applicable rates should be set according to the time of charging, based on the availability of renewable sources, according to when there is a greater supply of energy in the electricity grids.

The inherent cost of properly managing the recycling and disposal of batteries should be considered. Circular economy programmes should be set up that take care of the final disposal of the batteries as well as the emissions associated with their export, in case the recycling is outsourced to other countries. For example, there is a pilot case in the region in Costa Rica with support from the German Agency for International Cooperation (GIZ). A pilot project was set up so that national companies could be responsible for the transformation of batteries through processes that minimize waste generation and promote the circular economy in the region.

Development of an offer focused on public and non-motorized transport

The recommended pathway for the countries in the region **is to prioritize the implementation of efficient public transport systems, with good coverage, excellent service and low-emission technologies, as well as the promotion of non-motorized transport in urban areas.** For non-motorized transport, it is essential to build high-quality infrastructure, promote

it, and develop initiatives to ensure comfortable and safe travel. The current context is that in several LAC cities' infrastructure is often deficient or non-existent, which represents a significant barrier to its use and excludes vulnerable users, such as children, women and the elderly. In Latin America, for every million inhabitants, there are 11 kilometres of cycle lanes, compared to 2,000 km of road infrastructure, according to Urban Road Network Data. This indicates that less than 4 percent is invested in pedestrian and bicycle infrastructure in the region, in contrast to the 19 percent invested in Europe [58] [59].

Annex 2 presents a list of specific projects for public and non-motorized transport, with benefits and practical experiences in some LAC countries. Similarly, Table 3 presents a series of recommendations associated with non-motorized transport.

Financing of low-emission transport supply

To aid decision-making, it is **recommended that tools be developed to estimate the Total Cost of Ownership** (TCO) by recognizing the financial and economic costs associated with different propulsion technology alternatives or different transport systems, for comparison purposes. The exercise should determine the following:

- Estimate the cost model, including all the relevant transport components such as CAPEX. This includes the initial investment (vehicle and infrastructure), and lifetime investments (e.g. battery replacement).
- Estimate OPEX. This includes maintenance costs, the energy or fuel used, and the costs of final disposal and recycling of batteries.
- Recognize **subsidies**, **exemptions**, or other costs derived from public policies that create incentives to use specific alternatives. This will reflect the real cost of one gallon of diesel, for example, without being pegged to subsidized prices.
- Obtain baseline figures to estimate funding needs or the fiscal burden of establishing measures such as subsidies for public transport procurement.

As a reference for the light vehicle fleet, the production cost of a hybrid, electric or hydrogen vehicle is respectively 1.4, 1.6 and 2.0 times higher than a conventional car, according to figures provided by Toyota. These TCO levels may vary depending on the country and city, so it is important to consider the geographic, social, tax, economic, cultural and energy context in each case, to identify the most viable options.

Given that calculating the TCO relies heavily on accurate and truthful data, **it is recommended that a commitment be established among the countries of the region to collect and share the results of pilot tests and operations.** This collaboration will provide the region with information based on real experiences, facilitating more informed decision-making by comparing technologies and determining which is the most appropriate for each urban context. It is also essential to evaluate the mechanisms and parameters needed to consolidate and share relevant information so that it can be used in the planning and development of projects in various locations. This collaborative approach would strengthen the ability to make informed and suitable decisions in the implementation of more sustainable propulsion technologies in the region.

It is recommended that a sound and flexible financial strategy be developed for the acquisition and operation of vehicles that meet NDC emissions reduction targets. This strategy should be based on a thorough analysis of suitable business models and of actual reduction in emissions on the ground in the medium and long term, considering the importance of developing pilot studies for obtaining real data and carrying out specific analyses for each city. Innovative financing alternatives include operational and financial leasing, green bonds, Fleet-As-A-Service (FAAS) models, Pay As You Save (PAYS), residual value guarantees, investment funds, mezzanine loans, partial risk guarantees and demand aggregation, as well as consideration of carbon markets.

While fiscal measures such as tax exemptions or reductions can be instrumental in accelerating the adoption of low-emission vehicles, they must be accompanied by a detailed analysis of actual emissions reductions, tailored to the specific context of each city. This will make it possible to define which vehicle technologies will be eligible for priority fiscal measures. For example, hybrid vehicles can vary in efficiency

from 5 percent (mild hybrid) to 35–40 percent (full hybrid), and a fully electric vehicle can have different emissions percentages depending on context of use. With these criteria, an appropriate percentage of tax and duty exemption can be determined.

Complementary elements related to freight transport

It is recommended that waterway transport, railway transport, and intermodal transport be strengthened (the latter to a significant extent), to improve the efficiency of freight transport. This is key, since waterway transport is 8.6 times more efficient than road transport, and railway transport is 3.5 times more efficient than road transport in terms of distance travelled per tonne of freight with one litre of fuel.

More projects need to be replicated that estimate and share the benefits of intermodal transport in the region, in terms of efficiency and reducing emissions. Mexico, for example, has collaborated with the National Private Transport Agency (‘*Agencia Nacional de Transporte Privado*’, ANTP) and GIZ to develop a tool that estimates emissions by offsetting freight, using double-length trailer trucks and implementing intermodality, which resulted in a 78 percent, 73 percent and 49 percent reduction in GHG emissions respectively.

It is recommended that monitoring systems be implemented to improve logistics efficiency and reduce the environmental impacts of freight transport. This includes the development and promotion of digital logistics coordination platforms that connect the players involved in the logistics chain, such as transport and logistics companies and operators. These platforms will support trip coordination and route optimization, which will help reduce empty journeys and reduce high occupancy trips, which have a major impact on road infrastructure. In addition, a live monitoring system should be established to accurately track vehicles, their freight and emissions, enable continual supervision of logistics operations. Furthermore, the implementation of incentives for freight consolidation will enable optimal use of available freight capacity. Carry out these actions will require the collaboration of public and private entities in the region.

These technological upgrades, as well as fleet renewal, require considerable investments. However, in the region, as mentioned above, ownership of the freight vehicle fleet is highly fragmented.

It is crucial to promote business formalization and regulations in the freight sector, to improve access to traditional sources of financing. However, it is imperative that these actions are framed within agile procedures that lead to reduced waiting times in the application and approval processes. This will avoid a situation similar to the one experienced in Colombia, where, despite efforts and policies, the planned objectives in terms of updating the freight vehicle fleet were not achieved.

The implementation of low-emission units should initially focus on first- and last-mile trips. However, the needs of each logistics chain must be assessed in detail. To this end, it is useful to implement projects such as the “*Pruebas TuVe*” (TuVe Tests) programme [60] developed in Uruguay, in which EVs from different suppliers were tested for one month, demonstrating their cost effectiveness, efficiency and convenience.

Finally, training in sustainable and efficient driving for freight transport drivers is recommended as an efficient short-term measure to reduce emissions. Efficient and safe driving means, in practice, operating vehicles in an optimal rev range, minimizing abrupt accelerations and gradual gear changes. This approach not only reduces fuel consumption but also improves driving safety [61]. According to the Organisation for Economic Co-operation and Development (OECD), this way of driving can reduce fuel consumption by 35 percent, while considerably reducing harmful emissions. Meanwhile, for EVs, eco-driving can increase the vehicle’s range by 30 percent to 40 percent [62].

It is recommended that a coordination and interoperability strategy between bordering countries be implemented as an essential measure to streamline freight transport in the region and promote trade and economic integration. This collaboration would be effective in generating coordination mechanisms to aid the efficient flow of freight and products across borders.

El Salvador, Guatemala and Honduras are considering the creation of a Trinational Freight Centre to consolidate freight, coordinate customs procedures and harmonize regulations among the three countries. This type of initiative would expedite the transport of freight between neighbouring countries and reduce the time and costs associated with customs and logistics procedures, and can be considered as NDC measures. It is also recommended that bilateral and trilateral agreements and protocols be established to define the procedures and requirements for the transport of freight between bordering countries. These agreements should address aspects such as required documentation, schedules and the operation of border points, which would support the movement of freight in an agile and safe manner.

4.3. Public policy and institutional recommendations

It is recommended that the elimination of subsidies on both supply and demand of conventional sources such as fossil fuels is promoted, to improve the competitiveness of cleaner and more sustainable energy technologies. To achieve this, it is essential to identify new schemes that transfer subsidies to municipal transport systems instead of keeping them focused on fuels. An example of this strategy is Colombia's Development Plan, which enables the country and its decentralized entities to make investments of between 40 percent to 70 percent in collective or mass public transport systems operating in cities, including the total or partial acquisition of new vehicles or new low-emission rolling stock.

However, given that some may oppose these measures, it is recommended that they are implemented gradually under offsetting schemes and in parallel with actions to improve transport supply, such as the implementation of public transport networks and cycle lanes, improvement in the quality of service provision and adopting low-emission fleets, among others.

In relation to the instruments for managing subsidies, it is suggested that schemes should be implemented that provide resources to finance the technical tariff, the acquisition of fleet or components of the operating costs. This is done to eliminate direct subsidies at service stations for fossil fuels, such as diesel or natural gas, as these distort the cost structure and technological selection of transport systems. An example of this approach can be seen in the "*Movés*" project in Uruguay where, through Law 19,670, the executive branch provided subsidies for fleet acquisition throughout the country, aimed at transport operators. More recently, in 2024, the government approved a Sustainable Mobility Trust, which reformed the previous Public Transport Trust to further promote the adoption of electric buses by redesigning the current diesel price reimbursement scheme and adding criteria for maximum fleet age, for environmental, energy efficiency and road safety reasons.

5 Conclusions

5. Conclusions

The analysis of the actions identified shows that all countries have a clear focus on the technological modernization of the public and light transport vehicle fleet. **The intention to migrate towards electric propulsion technologies and, in some cases, towards natural gas vehicles or Euro 5 technologies in the future, stands out. However, there are insufficient measures to improve the quality and coverage of the service, which is crucial to catalysing a modal shift towards more sustainable modes of transport.** Likewise, there is generally no analysis of the financial, economic, social, cultural and environmental feasibility of achieving the proposed goals at the required scale and time. This includes, in cases of electromobility, assessing effectiveness versus the benefits of reducing GHG emissions and other pollutants through the electrification of transport, considering the full life cycle/costs of this technology, particularly in cases where national grid electricity generation is predominantly fossil fuel-based.

There is a major opportunity to strengthen the actions in future generations of NDCs, around the renewal of the freight vehicle fleet and to promote intermodality. In the area of freight transport, only six countries have proposed mitigation actions, which shows the need for a greater level of ambition in the regional strategy, since freight transport is one of the main contributors to GHGs. Vehicle fleet renewal is crucial, as the current fleet mostly consists of relatively low-capacity trucks, with an average age of 15 years and low-emissions standards. There is also an important opportunity to strengthen actions in future generations of NDCs, focusing on improving the infrastructure, equipment and logistics necessary for intermodality between road, waterway and railway transport modes.

The nine LAC countries that present active mobility initiatives in their NDCs focus on cycling, promoting modal shift. This indicates an interest in reducing reliance on private vehicles and encouraging the use of bicycles as a sustainable means of transport. This is especially evident in countries such as Argentina, Barbados, Chile, Colombia, Costa Rica, Dominica, El Salvador, Mexico and the Dominican Republic. Bicycle-related commitments also include the construction and improvement of infrastructure, such as cycle lanes, segregated lanes, low-speed zones, and bicycle parking.

Of these nine countries with proposals on active mobility in their NDCs, seven include actions related to the pedestrian mode. Nevertheless, **there is an opportunity for most LAC countries to strengthen their commitments to promote walking as a means of transport in cities.** Improving pavements, implementing traffic calming zones, ensuring universal accessibility and creating safe crossings are key measures for promoting pedestrian mobility and improving pedestrian safety in cities.

Only five of the twenty countries that have proposed targets related to low-emissions transport have addressed demand management in the second generation of their NDCs. **This highlights an opportunity for other countries to consider the inclusion of broader approaches that enable effective demand management,** for example by focusing on increasing the use of public transport systems and non-motorized modes.

Sustainable urban planning is not sufficiently addressed in the NDCs of the countries analysed. This is despite their contribution to reducing emissions and improving people's quality of life.

As in the NDC actions, the LTSs focus mostly on actions for zero- or low-emission public transport, as well as a light vehicle fleet that is mostly powered by electric energy and the use of biofuels. While these targets aim to make countries less dependent on fossil fuels, they should be aligned with the progress being made by the NDCs. If necessary, their approaches should be reviewed and updated to achieve the objectives foreseen up to 2050.

Rather than focusing solely on the electrification of private vehicle fleets (going straight to the "technological" solution), LAC countries should rethink their sustainable mobility strategies based on a balance of demand management measures, accounting for the social and economic context of sustainable urban planning, and land use planning of transport supply. This tripartite approach, which first analyses the need for travel, and its efficiency if required, prioritizes reducing the number and

distance of trips, and then promotes sustainable transport systems, must be adapted to the specific characteristics of each national and urban context in order to be effective and sustainable. Factors such as urban density, socioeconomic, geographic and climatic conditions, and cultural relevance are essential to developing appropriate strategies. TOD in urban planning can aid the transition to compact and sustainable cities, although its benefits will only become clear in the medium term. These comprehensive strategies address emission reductions, economic losses and transport efficiency, which are all critical to meeting NDC targets and improving urban quality of life.

The technological renewal of the fleet towards low-emission vehicles in LAC is in its early stages and concentrated in a few cities, but the pioneering cities have established a replicable roadmap. The transition to low-emission technologies must consider the energy's complete generation and life cycle, as well as the renewable/fossil composition of the energy mix. It is crucial to carry out pilot studies to assess the viability of these technologies, involving key stakeholders and fostering strategic alliances with the private sector. If a transport electrification option is decided upon, the expansion of networks and charging stations, the regulation of "net-billing", the definition of responsibilities for the construction and maintenance of charging points, as well as appropriate management of the batteries' final disposal, are essential.

Chile and Colombia stand out in the region for having clear public policies and the development of economic incentives for the transition to low-emission fleets. Both countries have implemented legal frameworks that encourage the transition to low-emission vehicles, along with tax exemptions and subsidies that have encouraged both consumers and public transport companies. Collaboration with the private sector, especially on charging infrastructure and investment in sustainable mobility projects, has also been key. In addition, international support and funding from multilateral organizations have played an important role in driving these projects forward. In the same regard, Uruguay has successfully redirected its subsidies to fuels used in public transport to promote the acquisition of low-emission fleets.

To make financing decisions on low-emission transport, tools must be developed to estimate the TCO, accounting for investment and operating costs, and the subsidies granted to the different components according to propulsion technology. Regional collaboration to share data from pilot tests and operations is crucial for making informed decisions. In addition, flexible and sound financial strategies must be developed that include diverse financing alternatives and to evaluate fiscal mechanisms based on real emission reductions, adapted to the specific context of each city.

Progress in implementing the actions set out in the NDCs for road freight transport in LAC is significantly behind schedule, revealing the challenges the sector faces in managing these projects. Although some countries have made partial progress in adopting low-emission solutions in urban logistics, penetration of light trucks of this type remains very limited. Chile and Uruguay are the countries that have made the most progress, having implemented pilot programmes and promoted energy efficiency through a range of projects. However, other countries such as Guatemala, Costa Rica and Paraguay are still in the initial stages, with progress mainly in planning and setting out strategies. Colombia and Argentina are leading the way in the renewal of heavy-duty transport fleets, but there is still insufficient adoption of more efficient vehicles. Initiatives related to energy efficiency and biofuels have also shown limited progress, and the implementation of green hydrogen is still in its early stages. In addition, intermodal transport and sustainable logistics at ports and freight hubs are in the scoping and set-up stages, with little operational progress. The main barriers include lack of adequate financing, insufficient incentives and the inaccessibility of emerging technologies at reasonable prices. To meet NDC commitments by 2030, significant momentum in implementing comprehensive and ambitious measures is essential.

It is recommended that intermodal freight transport be promoted to take advantage of the fuel efficiency benefits offered by rail and waterway transport when used in conjunction with road transport. In addition, it is crucial to encourage the renewal of the road fleet and focus the implementation of low-emission units on first- and last-mile journeys, as hydrogen-based solutions evolve for heavy-duty vehicles. This strategy should be accompanied by the implementation of monitoring systems and digital logistics coordination platforms, with a view to optimizing routes and reducing the number of empty trips. Achieving these objectives will only be feasible if businesses are encouraged to formalize in the freight sector.

Annexes

Annex 1
Summary of progress by country

Antigua and Barbuda

This island nation **aims** to achieve zero emissions by 2040. To achieve this, it will implement measures to ensure that all vehicles sold are electric by gradually banning the import of internal combustion vehicles from 2025. In addition, Antigua and Barbuda aims for 100 percent of government vehicles to be electric.

In terms of **progress** towards the goal it has set, Antigua and Barbuda is working on creating a specific regulation for electromobility. It is currently drafting that regulation and evaluating bids to obtain the support of legal and regulatory advisers for guidance in this process.

With regard to public transport, Antigua and Barbuda is in a planning phase. Despite having measures in its NDC such as the incorporation of EVs for the government sector, it does not yet have pilot programmes or any formalized project. Transitioning to EVs will be possible, as the country is currently developing a project financed by the Green Climate Fund.

In addition, the country has implemented tax incentives to encourage the adoption of light EVs. At present, this type of vehicles is exempt from environmental duties and taxes, making them easier to buy and promoting their use in the country.

Argentina

Argentina's NDC **target** for 2030 is not to exceed 349 $_{MtCO2eq}$, including all sectors of the economy. Currently, the transport sector generates 13.9 percent of the country's total emissions, and for this reason it exhibits a cross-cutting approach in terms of public transport, freight, light vehicles and non-motorized transport to generate comprehensive policies and projects that will impact all types of transport and mobility to contribute towards the goal set for 2030.

In terms of **progress** towards achieving the established objective, Argentina has a National Climate Change Adaptation and Mitigation Plan that includes a series of projects focused on different sectors of the economy in which it estimates it can reduce GHGs. This document highlights railway initiatives that seek to increase the freight efficiency of this type of transport, as well as the incorporation of gas-powered buses into the public transport fleet.

Argentina, with its high natural gas potential, is proposing an energy transition plan in which Natural Gas Vehicles (NGVs) will play a key role in the public transport fleet. This strategy will have a positive impact on emissions reduction because, on average, a 12-metre bus generates 1.24 $kg_{CO2/km}$ travelled,[11] while a natural gas-powered bus of the same type generates 0.00068 $kg_{CO2/km}$ travelled [63]. In May 2022, the National Ministry of Transport and the '*Ente Nacional Regulador del Gas*' (National Gas Regulatory Agency) signed a cooperation agreement that aims to promote the switch to gas for freight and passenger transport as an intermediate step in the energy transformation of transport [64].

Progress outside the actions set out in the NDC is noteworthy, for example, Argentina has recently opened its first lithium cell factory with the aim of reducing its dependence on imports and boosting the domestic energy industry. This initiative will support the adoption of EVs.

Barbados

Barbados has a **goal** of being "fossil fuel free by 2030", backed by a clear and sound policy, incentives and investments in the sector.

In terms of **progress** towards achieving the target, according to a report by the Central Bank of Barbados from August 2022, approximately 17 percent of all cars imported into the country in the last two years

11 Taking into account the average emissions of a 12-metre Euro 3, Euro 6, Euro 5 and Euro 6 bus.

have been EVs. These advances in the adoption of EVs reflect Barbados' commitment and leadership in promoting cleaner and more sustainable transport, paving the way for a greener energy future. Barbados has demonstrated a strong commitment to energy transition and electric mobility. In addition, Barbados has a fleet of 49 electric buses operating in its capital, Bridgetown. This electric fleet began operations in 2020 with the incorporation of the first 35 vehicles and gradually adding other buses to this electric fleet.

The implementation of reliable charging infrastructure has been instrumental in driving the growth and acceptance of EVs in Barbados. Currently, the country has a network of public charging stations that outnumbers petrol service stations.

Belize

By 2030, Belize aims to avoid 117 KTnCO_2eq/year in the transport sector through a 15 percent reduction in fossil fuel consumption. To achieve this, in its NDC it proposed different lines of action to be implemented to promote and encourage electrified transport in the country.

The unconditional lines of action that it proposed focus on the need to produce a policy that promotes the most efficient vehicles, as well as a study on the feasibility of EV penetration in the country. In addition, they also aim to incorporate 77 hybrid buses by 2030. On the other hand, **conditional actions** focus on financing support and international technical assistance for the development of policies for the incorporation of efficient EVs.

Belize also has an **LTS document** which sets goals focused on the electrification of cars, motorbikes and buses. Additionally, it expects 10 percent of trips to be made by bicycle by 2050.

In terms of **progress** towards achieving the objective, with support from UNDP, in 2022 the country launched a pilot project for electric mobility in Belize's public transport system[12] to introduce at least six buses with this technology into the system.

Bolivia

In its NDC, Bolivia sets the **target** for the transport sector to increase the share of EVs in the Bolivian public transport fleet by 10 percent per year by 2030. This will be met through national efforts and its ambition can be expanded through international cooperation.

In terms of **progress** towards achieving the goal, Bolivia's regulatory framework includes Supreme Decree No. 4539, which encourages the manufacture, assembly and import of motor vehicles and agricultural machinery, both electric and hybrid, through tax and financial incentives. Additionally, it has four administrative resolutions that govern technical and tariff aspects related to EV charging. The country has some charging stations for EVs and, although these measures have generated growth in the fleet of electric cars, motorbikes and bicycles, there are still no electric buses in operation and their implementation is being studied in detail.

The country has also developed projects financed by multilateral banks and cooperation agencies that include training on hybrid and electric mobility, advice for promoting renewable energies and energy efficiency, and the preparation of its National Electric Mobility Strategy for Urban Public Transport in Bolivia (ENME), among other consultations that have already presented their results, such as the "Guide for the quantification of the reduction of Greenhouse Gas Emissions by the introduction of Electromobility in Bolivia" and the technical and economic feasibility study at pre-feasibility level, which estimates the macroeconomic impacts of introducing electric mobility into public transport in Bolivia. In addition, within the framework of this international cooperation project, the importance of promoting gender equality in the energy sector has been recognized through the creation of meeting and participation spaces for women professionals in the sector.

Costa Rica

Costa Rica has set a **mitigation target** within its NDC for 2030 of not exceeding 9.11 Mt_{CO2eq}, including all sectors of the economy. The transport sector accounts for 42 percent of the country's total emissions. In

12 Electric mobility pilot project for Belize (undp.org)

its NDC, it proposed nine contributions within the area of mobility and transport, which are the basis for producing roadmaps that will contribute to the mitigation of GHG emissions.

These **nine contributions** include projects such as the electric passenger train for the greater metropolitan area and the "*Limonense*" electric freight train (TELCA), as well as contributions focused on promoting the increased use of light **EVs** (cars and motorbikes) and public transport buses. In addition, Costa Rica included a contribution focused on increasing active mobility routes by 2030.

As part of the **progress** made, the transport sector has produced a series of documents that quantify the impact and seek to establish criteria to promote electric mobility. The main documents are:

- Fiscal impact of transport decarbonization in Costa Rica and policy options for achieving it;
- Economic impact study of investments and financing for replacement of the sustainable bus fleet in Costa Rica, electric buses for Costa Rica; and
- Learnings from a pilot project and recommendations for scaling up and national electric transport plan 2018–2030.

In addition, in 2017 Law 9518 was established, which establishes the **regulatory framework for electricity transmission in the country.**

Costa Rica has 57 semi-fast chargers in the country and, according to the Costa Rican Electric Mobility Association, there are currently around 8,800 registered EVs. With respect to public transport, pilot tests of electric buses produced positive results, and this is expected to give impetus to low-emission mobility with the acquisition of 500 electric buses within three years. Freight transport, however, is still in the set-up stage, since a pilot plan has not yet been conducted for this type of vehicle and for the TELCA electric freight train to come into operation.

Costa Rica is one of the countries analysed in this study that has a LTS document that puts forward low-emission and active mobility targets to be achieved between 2035 and 2050. This document, called the National Decarbonization Plan 2018–2050, covers 10 lines of action, of which three are focused on the implementation of low-emission vehicles. These focus areas are on light, public transport and freight vehicles.

Dominica

Dominica **aims** to reduce GHG emissions by 45 percent below 2014 levels by 2030. In addition, for the transport sector, it proposes a 20 percent reduction in emissions for the same year compared to a business-as-usual (BAU) scenario.

In terms of **progress**, although Dominica has incentives for the import of EVs and has deployed charging infrastructure, this has not been sufficient to motivate the purchase of EVs in order to achieve the target established in the NDC. The main limitations include the cost of the vehicles and the lack of local sellers, which complicates the procurement of spare parts and maintenance. The country's progress is focused on electromobility, since it was not possible to identify goals achieved on the other fronts.

Ecuador

Ecuador **committed** in its NDC to reducing emissions by 9 percent unconditionally, and 20.9 percent conditionally by 2025 compared to the baseline scenario.

Transport **mitigation action lines** include several initiatives in both the conditional and unconditional scenarios:

The **conditional scenario** seeks to develop and implement safe and sustainable transport through the NAMA Facility initiative for freight and passenger transport, by developing actions to reduce GHG emissions in Quito, Guayaquil and Cuenca. The **unconditional scenario** seeks to promote and implement sustainable mobility through efficient public transport initiatives such as the operation of the Quito Metro and the Cuenca Tramway.

In terms of **progress**, Ecuador has put the Quito Metro and the Cuenca Tramway into operation, thus complying with the mitigation action lines outlined in the unconditional scenario for the transport sector.

In addition, even though it is not part of the NDC, Ecuador has developed a National Electromobility Strategy, whose objective is to promote, consolidate and mainstream the use of EVs by 2040. This strategy aims to promote the incorporation of public transport buses, light vehicles, taxis and electric light-duty freight trucks.

El Salvador

El Salvador's NDC sets a reduction **target** for 2030 of 640 Kt_{CO2eq} from fossil fuel burning activities in the energy sector. This target can be increased to 819 Kt_{CO2eq} with international support. Measures proposed to achieve this objective include the introduction of electromobility in the transport sector, with the main focus on public and private passenger transport.

For the introduction of electromobility, four penetration scenarios were established in which the total number of EVs is expected to range between 7 percent and 20 percent. There are therefore conditioning elements such as the creation and implementation of a regulatory framework for the import of vehicles with financial incentives, financing for investment in infrastructure, large-scale development and communication processes for the acceptance of this type of vehicles and incentives for public transport regarding the acquisition and use of EVs.

The **adaptation goal**, meanwhile, proposes measures for the transport sector to encourage and promote sustainable transport modes in alignment with the National Energy Policy 2020–2050. These measures focus on the implementation of sustainable transport modes through the promotion of active mobility, restricted speed zones and traffic management; in consideration of road safety and promotion of public spaces.

Although there are still no electric buses in operation, the country has made **progress** in the validation and review of the **National Electric Mobility Strategy**, and an inter-institutional technical panel for electric mobility is being set up. In addition, the Law on the Promotion of and Incentives for the Import and Use of Electric and Hybrid Means of Transport has been enacted. Although this law provides for incentives such as 100 percent VAT exemption, it excludes public and freight transport; therefore, reforms to this and other laws are still required to adapt them to electric mobility.

In parallel, initiatives are being carried out on other fronts, including the public transport restructuring process, which includes participation by stakeholders in its association and reorganization, and the 2019–2020 Master Plan, which included the construction of a cycle route network, in which greater investments are still required to ensure intermodality. Other projects include the introduction of EVs into government institutions and solid waste collection vehicles, changing the traffic light system, the establishment of a control and monitoring centre, the development of a public safety perception survey for public transport users, the design of an intervention to reduce sexual harassment in San Salvador, the development of a monitoring, review and reporting system for the implementation of electric mobility, and the creation of the Air Quality Regulation to improve the environment and reduce pollution.

Guatemala

In its NDC, Guatemala **committed** to reducing 11.2 percent of projected emissions by 2030. With international support, the goal is to reduce 22.6 percent of GHG emissions, equivalent to 56.6 Mt of $_{CO2eq.}$ This commitment includes the incorporation of sustainable mobility in the country by implementing electromobility and through the use of biofuels.

This is expected to achieve a 24.3 percent substitution of the private vehicle fleet with EVs by 2032. In addition, it is expected to combine regulatory measures (vehicle gas regulations) with incentives (tax credits or other fiscal measures) for the purchase and replacement of more efficient vehicles (hybrid and electric), as well as establishing the necessary infrastructure for their operation.

It also considers the implementation of a programme to promote the use of advanced ethanol in petrol in Guatemala. That programme will combine regulatory measures such as a new law to reduce emissions from petrol-powered cars. This measure is expected to generate a reduction of 2.5 Mt of $_{CO2eq}$ by 2030, which corresponds to 41 percent of the projected reductions in the target set out in the NDC.

In terms of **progress**, the Electric Mobility Association of Guatemala (*AMEGUA* in Spanish) highlights the recent tax incentive law in Guatemala that has exempted hybrid and EVs from taxes, to encourage

their acquisition and use. Additionally, the country has deployed a network of approximately 40 charging points and 60 chargers throughout Guatemala, to encourage the use of this type of vehicle.

Guatemala has also set a target of having 24 electric buses in its Transmetro system operated by female drivers. To achieve this target, a strategic alliance has been forged between Transmetro and the Municipal Women's Directorate. This collaboration has led to an initiative to launch an open call for applications, in which more than 700 women interested in this opportunity actively participated.

In addition, in terms of initiatives that are not part of the NDCs but which contribute to emissions mitigation, Guatemala has already begun the construction of the "*MetroRiel*" light railway in Guatemala City, which is expected to be completed by 2027.

Haiti

Haiti is vulnerable to the effects of climate change, and faces constraints because of its social dynamics. Like other Caribbean countries, most of its vehicle fleet is made up of imported used vehicles, and this has led to stricter regulations for these vehicles' entry into the country. For example, it has been decreed that vehicles older than three years cannot be imported into Haiti. These measures aim to address the challenges associated with mobility and promote a transition to more sustainable transport options.

Honduras

The NDC of Honduras has **13 objectives** classified under mitigation, adaptation, or a synergy between the two. From the two classifications, the relevant objectives in transport are "**objective 4 bioenergy**", which proposes to promote the generation of biofuels and biogas; and "**objective 6 electromobility**", which proposes to promote low-emission mobility through the policies, strategies, a regulatory framework, schemes and incentives, programmes and projects for the adoption of electric mobility in Honduras.

In addition, Honduras has an **objective** in its NDC to reduce emissions by 16 percent in a BAU scenario. To achieve this goal, the country has tools such as the National Electric Mobility Strategy[13], which sets out the strategic focus areas and priority actions to accelerate the adoption of electromobility, focusing specifically on the renewal of the public and private transport fleet. This strategy serves as a prelude to the Electric Mobility Law, for which a bill is being drafted, and includes various economic incentives to encourage the acquisition of EVs in the country.

These public policy documents are currently under review, as the incoming government has prioritized actions to address climate change in its Government Plan 2022–2026, which will involve updating targets and deadlines. The National Electric Mobility Committee is expected to be approved by executive decree.

In terms of **progress,** Honduras is developing multiple projects for the promotion and introduction of EVs. One of these is the initiative Promoting Electric Mobility in Honduras towards Regional Integration (*Promovehr* in Spanish), which is a triangular cooperation initiative between the Costa Rican Government, GIZ and Honduras. Its objective is to implement and promote a sustainable public transport system using hybrid and electric cars to help reduce fossil fuel consumption.

With regard to public transport, Honduras has proposed several pilot projects that are in the proposal and consultation phase with authorities and stakeholders. In addition, donations of electric buses are expected to be received from the Republic of Korea by the end of 2023.

For private transport, the implementation of EVs has been growing – by the end of 2022 there were 40 EVs registered in the country. By 2030, 2.1 percent of the fleet is expected to be electric; this includes cars, motorbikes and buses [65].

Panama

Panama includes the transport sector within the energy sector and set, within its NDC, the **objective** of reducing emissions from this sector by 11.3 percent by 2030 and 24 percent by 2050. Additionally, the second commitment states that by 2025 Panama will

13 For the time being, it is possible to consult the draft strategy.

have a national climate change plan for the energy sector, and this will include mitigation and adaptation approaches.

Panama based its commitments on the Strategic Guidelines of the Energy Transition Agenda 2020–2030. This document focuses on five pillars, one of which is the **electric mobility** pillar, which seeks to promote low-emission mobility through policies and programmes that encourage the transition to EVs. Other relevant documents that will provide Panama with the necessary basis to expand low-emission mobility are the National Strategy for Electric Mobility, produced in 2019, and the National Strategy for Green Hydrogen and Derivatives, from April 2023.

In terms of **progress,** Panama has 164 electric chargers across the country to promote electric mobility in light vehicles, which have seen a significant increase from 21 vehicles in 2020 to 160 just two years later. In addition, it is expected that by 2025 Panama will have 414 electric buses in the public service fleet.

Paraguay

Paraguay **commits** in its NDC to reducing 20 percent of projected emissions in the BAU scenario by 2030, with 10 percent depending on international support and the other 10 percent with its own resources. This commitment includes climate change adaptation targets and prioritized mitigation measures to reduce GHG emissions in sectors such as transport. These measures include replacing fossil fuels with biofuels and promoting efficient driving and electric mobility.

In terms of **progress**, in 2023 Paraguay presented the Electric Mobility Master Plan (‘*Plan Maestro de Movilidad Eléctrica’*, PMME), which aims to have a fully electric public transport fleet in the main cities by 2040. Among the projects under development are the incorporation of 500 electric buses in Asunción, the acquisition of EVs in Ciudad del Este and Encarnación, and the implementation of a light train in Asunción. These projects are financially supported by entities such as the NAMA Facility and the Inter-American Development Bank (IDB), which seek to smooth the transition to electric mobility and the replacement of conventional units.

Paraguay also focuses on improving transport infrastructure to support adaptation to the effects of climate change. Through its 2030 National Development Plan (NDP), the country is projecting a 63 percent increase in paved road networks and the revitalization of the railway network to improve internal connectivity and offer transport alternatives for both passengers and freight. In addition, priority is being given to projects to improve the navigability of the Paraguay River, which is essential for the country’s foreign trade. However, there are still no specific projects to ensure navigation during low water levels.

For the electrification of freight transport, the Electric Mobility Master Plan proposes to convert 50 percent of delivery trucks to EVs and to replace delivery motorbikes with electric alternatives. It also proposes the creation of an intersectoral logistics electromobility panel to coordinate actions and collect data to support the adoption of clean technologies. Through these initiatives and adaptation measures, Paraguay seeks to foster a transition to more sustainable transport, with a focus on emissions reduction and infrastructure improvement to address climate challenges.

Paraguay is also promoting the progressive replacement fossil fuels with biofuels to achieve the goal set in its NDC of increasing the quantity of biodiesel in diesel to 7.5 percent, and of bioethanol in petrol to 27.5 percent. To this end, it has a solid regulatory framework that promotes the production of biodiesel and bioethanol through fiscal benefits for manufacturing industries. These benefits include tax reductions, exemption from import duties on equipment and government tariffs related to measurement, production, distribution or sale. The measures are supported by Law 6.389 of 2019 and Decree 3.55 of 2020, which currently establish a maximum blending percentage of 5 percent, which will need to be increased to reach the targets set in the country’s NDC.

Dominican Republic

This island’s NDC sets a **goal** of a 27 percent reduction in GHG emissions compared to BAU by 2030. Of this percentage, 20 percent of the objective is conditional on external finance and 7 percent is unconditional on domestic finance.

Overall, the NDC presents **46 mitigation options**, of which 11 are focused on the transport sector. Initiatives that stand out include the operation of *subway and cable car systems* and the incorporation of EVs for *light and public service vehicles* (buses and taxi). In addition, other initiatives are being considered to improve *cycle lane* networks and the adaptation of a safe and efficient *school transport* service with electric buses.

In terms of **progress**, the country is in a planning stage, with various plans and policies such as the National Strategic Plan for Electric Mobility. This plan's ambitious goals include achieving a phased registration of 15 percent EVs by 2025 and 30 percent by 2030, and ensuring that 30 percent of the vehicle fleet used in public and passenger transport consists of EVs by 2030.

In addition, the Strategic Plan for Electric Mobility, which sets out the strategies and lines of action to promote electromobility, has established a 2020–2030 Action Plan to be used as a preliminary draft for the law stipulating all the specific criteria for promoting electric mobility in the country in an organized and coordinated manner.

In the regulatory framework, Law 103-13 encourages the import of low-emission vehicles through tax reductions.

Despite public transport sector challenges, where work is being done to formalize and update the vehicle fleet, progress has been made in the construction of a new subway line, scheduled for completion in early 2024, although challenges have been identified in obtaining resources to carry out the works.

Regarding active mobility, work is underway to create a manual for the implementation of bicycle infrastructure as part of the NDC efforts.

Clean energy generation in the Dominican Republic is low, with 85 percent coming from fossil fuels in 2020. Using hybrid vehicles may therefore be more effective than an all-electric fleet, as it would avoid increasing demand in an energy mix dominated by hydrocarbons and would reduce pollution problems from discarded batteries in 10–15 years.

Trinidad and Tobago

This group of islands located in the Caribbean set an **unconditional goal** in its NDC to reduce public transport emissions by 30 percent by 2030. In addition, they indicated that under certain **support conditions** they would be able to reduce total emissions to 15 percent of the total calculated in the BAU scenario for the same year.

Regarding **progress** to achieve this goal, the country's state university has a pilot electric bus that will provide relevant information about the impact that this type of technology could have in the country when used on a large scale. This is expected to provide valuable information to ensure that current public transport buses are replaced with vehicles with low-emission technologies.

Annex 2
Specific recommendations associated with demand management and improving the supply of public and non-motorized transport

Table 1. Recommendations associated with demand management (part 1/2)

Measure	Benefits	References
Parking management	• Improve mobility by promoting reduced use of cars through parking restrictions or additional parking charges. • Encourage the use of public transport and other sustainable modes.	• San Francisco (USA) has dynamic tariffs that adjust according to time, zone, the last month's rate and sensor data. The city has a strong governance structure that is committed to continuous technological progress. • In Mexico City, the measure has specific codes, regulations and standards governing cars. Law enforcement is shared between private operators and authorities. However, the implementation of these strategies has not been accompanied by measures and initiatives that help to update policies and systems. • These two cities stand out for their strong regulatory framework that enables each city to implement the measure efficiently.
Congestion Charges	• Reduces traffic in urban areas by discouraging car use through tolls. Improves air quality and transport efficiency.	• Singapore has a free-flow electronic toll collection system that improves the reliability and efficiency of charge collection, allowing dynamic fares that optimize use of the lanes according to vehicle flow and area. Tariffs vary according to the size of the vehicle and there are phased charges to avoid traffic peaks. • In London (UK), the initiative demonstrated the importance of effective communication and stakeholder involvement in gaining acceptance. It should be noted that this measure was coupled with improvements in public transport. • In Santiago, Chile, the model has demonstrated that construction, operation and maintenance concessions are viable in urban contexts. Dynamic tariffs are based on observed speeds. The urban toll scheme is managed by the Ministry of Public Works. • These cities highlight the need for a sound legal framework for implementing this initiative, with strong communication campaigns to ensure that citizens take ownership of the measure and understand its associated benefits.

Table 1. Recommendations associated with demand management (part 2/2)

Measure	Benefits	References
Dissuasive parking (Park and Ride)	• This allows drivers to use their private vehicle to access public transport to get into the city or specific areas, reducing congestion in these areas.	• In London (UK), park and ride facilities are strategically located on the city's outskirts and connected to the Underground and buses, supported by the Oyster payment system. This has increased public transport use. • In Portland (USA), parking lots are located along major motorways and connect to the MAX light railway, offering a reliable and safe service, with information in real time. • Both cities demonstrate the importance of strategic location, public transport integration and community engagement for successful systems.
Financial Incentives	• Encourages citizens to opt for more ecological and economical alternatives, reducing dependence on cars.	• Vienna (Austria) seeks to promote the use of public transport and reduce car dependency through subsidies and reduced fares to increase the use of sustainable modes and reduce polluting emissions. • Tokyo (Japan) seeks to reduce the use of particulate-emitting vehicles through subsidies and discounts on public transport fares. It is noteworthy that the measure coincides with improvements to active mobility infrastructure, and the increase in the supply of high-quality public transport through collaboration between various stakeholders and citizen education. • Both cities are accompanying this measure with projects to improve and upgrade public transport and active mobility zones to make the use of private cars less attractive.
Carpooling	• Reduces the number of vehicles in circulation, lowers congestion and polluting gas emissions, and fosters a more sustainable and collaborative mobility culture.	• In San Francisco (USA), the introduction of High Occupancy Vehicle (HOV) lanes, reduced toll fares and the 511 Rideshare programme with employer collaboration, have significantly increased carpooling participation and reduced traffic. • Initiatives in Amsterdam (Netherlands) include dedicated lanes for carpooling, preferential parking and the use of apps such as "Toogether" to facilitate ride sharing. Government incentives and corporate support have further increased participation. • Both cities highlight the effectiveness of integrating technology, offering incentives and encouraging community participation to promote sustainable transport.

Table 2. Recommendations related to public transport (part 1/4)

Measure	Impact	Reference
Electrify the bus fleet	• Reduction of GHG emissions and polluting gases. • Less noise inside and outside the transport units. • Creation of synergies with the community by mainstreaming an environmentally friendly mode of transport, building awareness and support from people.	• Bogota has 1,485 electric buses in its Integrated Public Transport System (SITP in Spanish), confirming that it is possible to set up a zoned operation with electric buses that are economically viable for the city. • Mexico City operates line 4 of its Metrobus system with electric buses, demonstrating that electrification is also viable in BRT systems, while proposing a phased transition of this system to electric buses only. • Santiago has 1,180 electric buses in its Metropolitan Mobility Network, advancing towards its ambitious goal of electrifying its entire transport fleet by 2040.
Reorganize routes and services of public transport systems.	• Optimization of supply and routes, resulting in lower fuel consumption and reducing component wear. • Improved operational and cost efficiency, freeing up resources to invest in vehicle fleet renewal. • Demand incentives owing to improvements in coverage, travel times, frequency and timeliness of services.	• In Mexico City, the restructuring of routes in the Passenger Transport Network (RTP in Spanish) and Metrobus system has allowed for greater efficiency and coverage, reducing congestion and improving accessibility. • In Bogota, the reorganization of SITP routes has enabled better coverage and frequency, optimizing resources and improving user experience. • In Lima, the implementation of core routes and new feeder routes in its Metropolitano BRT has improved the efficiency and coverage of the public transport system.
Implement actions to improve citizen and road safety in public transport and non-motorized transport.	• Increased demand from sustainable transport users as they see that risks to their safety and well-being have been reduced, while the need for people to opt for cars or motorbikes is also reduced. • Reduction of road accidents, safeguarding the safety and well-being of passengers, drivers, operating staff, cyclists, pedestrians and all other road users. • Lower crime rates on transport systems and bike lanes, generating spaces where citizens can travel with confidence and enjoy sustainable mobility.	• In Mexico City and Bogota, cameras installed on the Metrobus and SITP buses and stations have significantly improved security and reduced crime on public transport. • In São Paulo, the "*São Paulo tem pressa*" campaign has educated drivers and pedestrians about safe practices, reducing accidents and improving road safety.

Table 2. Recommendations related to public transport (part 2/4)

Measure	Impact	Reference
Improving coverage of sustainable transport systems	• Increased demand by integrating users from all areas of a city, particularly those that are difficult to access. • Fall in the need to use private modes of transport with high negative externalities for the environment and congestion. • Restructuring of informal transport systems that tend to take precedence in hard-to-reach areas, increasing road and citizen safety for those who are usually forced to take these non-formalized forms of transport.	• In La Paz-El Alto, the "*Mi Teleférico*" cable car system has improved connectivity between La Paz and El Alto, offering an efficient and sustainable transport alternative in a region with difficult terrain. • In Medellín, the Metrocable cable car system has significantly improved public transport coverage in mountainous areas, connecting peripheral neighbourhoods with the city centre.
Prioritize and promote modal integration in public transport.	• Adapting means of transport to each type of terrain according to the different topologies of a city, in addition to adapting the design of different walkways to meet demand. • Creating a transport system that is resilient to operational developments, so that if one of the subsystems fails, another can efficiently meet its demand. • Improved accessibility by guaranteeing transport subsystems even in the hardest-to-reach areas, guaranteeing the integration of first- and last- mile trips in a single payment.	• Medellín and its Integrated Transport System in the Aburrá Valley stand out as an example of intermodality, offering a single payment for trips on its Metro, MetroCable, the Ayacucho Tramway, the Metroplús BRT, integrated buses and the "*EnCicla*" public cycle system. All these subsystems are fully integrated and are an excellent example of how to guarantee coverage in a city with varied topologies, allowing passengers to choose the best means of transport for each type of terrain. • The Santiago Metropolitan Mobility Network is another clear example of intermodality, integrating its subway network, urban bus system, the "NOS and Rancagua" commuter trains, and "BikeSantiago" cycle-sharing system. This case shows that a transport system should not depend entirely on its subway network, because if any operational incident occurs, it is important to have other means of transport that serve as an efficient alternative, such as in Santiago where bus lines operate along parallel routes to the subway.

Table 2. Recommendations related to public transport (part 3/4)

Measure	Impact	Reference
Integrate fares into transport subsystems and create affordable fares	• Create incentives for intermodality by allowing access to a range of means of transport with a single payment, thus securing operational and economic efficiencies for transport systems. • Increase user demand by offering a competitive transport fare that people can afford, while reducing fare evasion. • Improving citizens' quality of life, particularly the poorest populations, by ensuring they can access a high-quality sustainable transport service at a fair fare that they can afford to pay.	• In Bogota, the SITP allows different means of public transport to be used with a single payment, regardless of the distance travelled, granting a time window of 90 minutes to make up to two transfers. This mainly benefits more economically disadvantaged people who live in the most remote areas, to prevent them from paying a premium for the transport service. • In Mexico City the passenger tariff is noticeably low, despite being one of the cities with the highest cost of living in LAC. This allows people from all socioeconomic sectors to have equal access to the subway, BRT buses and urban buses.
Maintaining the affordability of transport systems, while prioritizing low emissions	• Reduction of GHG emissions from transport without affecting users with fare increases. • Maintain or increase user demand while upgrading the fleet technology.	• In Santiago, subsidies have been implemented for the acquisition of electric buses in its Metropolitan MobilityNetwork, which has enabled 1,180 electric buses to be incorporated without increasing user fares. • In Bogota, the provision of the electric and natural gas fleet has been separated from their operation, so that each of these activities has been commissioned independently. This has therefore created a system where the acquisition of buses and their operation are financed separately, allowing the fleet to be updated without affecting user fares. • Curitiba has implemented a business model for the acquisition of electric buses through public-private partnerships, maintaining affordable fares while modernizing its transport fleet.

Table 2. Recommendations related to public transport (part 4/4)

Medida	Impacto	Referencia
ITS implementation for fleet control and user information	• Optimization of routes and schedules, reducing delays and improving service frequency and punctuality. • Asset management and cost reduction, streamlining maintenance scheduling, reducing fuel consumption and operating costs. • Increase user demand by providing passengers with reliable information on transport services to increase their confidence in the system. • Improve trip planning, reducing waiting and travel times.	• Integrated transport systems in cities such as Mexico City, Bogota, Medellín, Buenos Aires, Santiago, have implemented real-time monitoring systems for the operation of buses, tramways and subways, significantly improving punctuality and reducing waiting times. • In addition, information on their transport services is accessible on information panels at stations and mobile applications designed for this purpose, so that users can plan their trips in advance. The integration with Google Maps is particularly notable; it uses the General Transit Feed Specification (GTFS) standard.
Planning with a Gender Equality and Social Inclusion (GESI) approach	• Active inclusion of women and vulnerable groups in the social and economic benefits produced by the transition to low-emission mobility. • Increased participation of women, people with disabilities and vulnerable groups in the use of public transport services and active mobility, creating safe, accommodating spaces adapted to the needs of each person.	• In Mexico City the "*Viajemos Seguras*" (Let's Travel Safely) programme offers carriages exclusively for women and children in the Metro and Metrobus, improving their safety and comfort. • In Guatemala City, there are active plans to set up a line with 24 electric buses driven exclusively by women who are being trained. • In Lima, the policy of differentiated fares on its Metropolitano system seeks to promote social inclusion, offering discounts to students, senior citizens and people with disabilities.

Table 3. Recommendations related to non-motorized transport

Measure	Impact	Reference
Create indicators of walkability and cyclability	Implementing the calculation of these indicators provides objective knowledge of different urban variables that are conducive, or not conducive, to walking and cycling in the city. With these indicators, measurements and comparisons of different areas can be made in order to carry out analyses to determine which urban spaces should be prioritized for intervention and the type of intervention to be carried out.	Bogota has calculated this type of indicator at road section level, making it possible to carry out comparative analyses of different zone planning units (ZPU) to determine which should be prioritized for improving physical, safety, accessibility and comfort conditions to encourage walking and cycling.
Design and build non-motorized transport infrastructure in accordance with complete streets principles and universal accessibility	Using these principles for road design and construction has positive impacts on public health, the environment, the economy, social inclusion and urban planning. It promotes physical activity, reduces carbon emissions, revitalizes urban areas and ensures that all citizens, whatever their ability, can access and benefit from transport infrastructure, creating safer, more sustainable and equitable cities.	Portland has a Pedestrian Design Guide which integrates a wide range of design criteria and practices into a coherent set of standards and guidelines that, over time, will promote a walkable and user-friendly city for all. Establish pavement design criteria, including requirements for minimum pavement widths, spacing requirements for street trees, corners and intersections, among others.

Annex 3
Methodology for publication development

A 3.1. Technical scope and methodology

The review of secondary data focused on the identification and classification of the commitments defined in the second generation of NDCs and in the LTSs of the 20 countries included in this study. The commitments were classified into three main sectors: **Transport, Energy and Cross-cutting,** the latter group referring to commitments that are common to different sectors of activity, as is often the case with gender and equality.

The analysis was developed by grouping the NDCs into four evolutionary stages related to the sector: 1) development of transport supply; 2) demand management; 3) urban planning and its interaction with transport; 4) mainstreaming of gender equality and social inclusion initiatives in the transport sector.

Similarly, in item one, "Transport Supply", the commitments have been evaluated by mode and means of transport. In other words, for public transport: bus, train/subway; for light vehicles: cars, motorbike and taxi; and for non-motorized transport: pedestrian, skateboard and bicycle. For freight transport, the interurban road mode (heavy vehicles), urban road mode (light vehicles), intermodal logistics, rail freight and waterway systems are addressed differently.

For some countries a review was conducted of the strategies, commitments and complementary measures contained in public policy documents; national development, adaptation and mitigation plans; or current regulations. This review has been developed mainly on the five countries for which detailed case studies were constructed, or where country representatives have shared these documents as relevant information. **It should be noted that the strategies, commitments or measures in these documents have only been considered for the purpose of this study if they expand or clarify the scope of the commitments officially established in the NDCs or LTSs.** In this regard, it is important to mention that, although some countries may have complementary national or regional strategies and measures, these strategies and measures are not included in the balance if they do not correspond to NDC or LTS targets, or if they have not been officially reported, since this analysis focuses on progress on NDCs/LTSs.

Next, for each of the 20 countries, secondary data was analysed to understand the status of progress in implementing activities focused on compliance with the NDCs and LTSs. Here it is possible to cite documents such as national strategies for electric mobility, strategies related to green hydrogen, pilot results focused on low-emission transport, GESI-focused projects, or laws and regulations to incentivize/manage the introduction of low-emission vehicles. In addition, public figures on the emissions of each country's transport sector, the market penetration of low-emission vehicles, or the implementation of environmentally friendly public transport units, were also taken into account.

The objective of this was to analyse how compliance with the NDCs and LTSs is taking shape in activities, projects, measures or regulations in each country. The aim is to understand how the development of these initiatives has progressed towards the set target, which is usually 2030 in the case of second-generation NDCs, and 2050 for LTSs.

For the NDCs covered by this study, an individual analysis has been carried out per each commitment in the five case study countries, while in other countries a general progress assessment on their NDCs has been developed, highlighting the good practices of some countries in specific areas.

For the LTSs, the analysis has been carried out at a more general level, given that they are beginning to be

developed as a long-term vision to guide the actions of the states and strengthen the periodic formulation of new NDCs.

The direct consultation process with UNDP country representatives and representatives of national authorities was valuable in accessing this secondary data and gaining a broader understanding of each country's context.

A 3.2. Interviews and primary data collection

Primary data was collected through direct interviews with environmental, energy and/or transport authorities in the countries covered by this study. In addition, for Mexico, Guatemala and Colombia, interviews were conducted with transport management entities or operators. For this purpose, individual questionnaires were prepared for each country to clarify and support the findings made during the analysis of secondary data.

Although the interview questionnaires were designed individually for each country, it is possible to establish a list of common components into which the questions can be grouped:

- The first group of questions focused on the progress on compliance with the NDCs and LTSs related to the transport sector.
- A second component consisted of questions aimed at determining the penetration of low-emission transport units in the different supply segments: public, private, and freight transport.
- The third component was designed to obtain information on the scope and results of programmes and pilots aimed at promoting more environmentally friendly modes of transport, particularly the use of EVs, the introduction of green hydrogen-based technologies, the promotion of biofuels or the transition to natural gas.
- The fourth component of questions focused on learning about the results of incentives and regulations developed by each government to promote sustainable transport. The economic and fiscal impact of measures aimed at financing or subsidizing the transition to low-emission mobility was also explored.
- The fifth component was related to programmes and policies to increase GESI in the transport sector.
- The sixth component explored the development and deployment of MRV systems for emissions from the transport sector, while also seeking a breakdown of emissions figures by mode of transport, where possible.
- Finally, the seventh component of the questions focused on asking about the support needs that each country identifies as a priority, so that international cooperation can contribute more efficiently to accelerating the transition to low-emission transport technologies in LAC. At this stage, the next steps proposed for accelerating the implementation of the commitments set out within the NDC of each country were explored.

During the interviews, representatives from authorities in each country shared their experiences and lessons learned during the planning and/or implementation of different initiatives related to low-emission transport. It was also possible to learn first-hand about the enabling measures being adopted to promote low-emission mobility in terms of regulation, standards, infrastructure, institutional arrangements, training and capacity-building, financial and tax incentives, fossil fuel subsidies, gender equality and inclusion, among others.

It should be noted that it was not possible to establish formal contact with representatives from authorities in Barbados, Bolivia, Dominica and Haiti. The information presented on these countries will consequently be limited and will derive from secondary sources. Moreover, it will not be possible to present an evaluation of the progress made by these four countries, since only updated primary data could be obtained.

The information gathered in these interviews, along with the secondary data previously analysed, was valuable in assessing actual progress in the implementation of the NDCs and LTSs related to low-emission transport. It was also possible to gain a deeper understanding of each country's context, including their best practices and achievements, as well as the source of the barriers hindering the sustainable transport transition in LAC. **The analysis of barriers alone is expected to be one of the major contributions of this publication**

to accelerating the achievement of the targets that have been set.

There is also one group of measures not reflected, even though they fit the criteria of contributing to the NDC or LTS. It is expected that identifying these actions could contribute to how each country increases its level of ambition towards a better global assessment of NDC progress in 2023.[14]

A 3.3. South-South exchange workshop and initiation of bilateral exchange process

Providing an initial space for in-person discussion, by inviting the 20 participating countries, was seen as an important part of the analysis. To this end, the workshop "Full speed on NDCs: Sharing progress on low-emissions transport" was held on 22–23 March 2023 in Santiago, Chile. The meeting brought together representatives from most of the countries included in this study, as well as from some countries in the Asia-Pacific region to share relevant experiences. This workshop was held under the auspices of the Government of Japan. The sessions during the two-day event were broadcast live for those who could not attend in person and are available on YouTube with an English translation.

The space enabled an international exchange of experiences on the implementation and development of initiatives focused on accelerating the transition to low-emission transport and served as a starting point to establish links with experts in each country for a more detailed and ongoing analysis. Government officials from key sectors such as environment, energy, finance and transport were invited. Representatives from the private sector also attended, particularly from companies relevant to the energy transition in the transport sector.

The workshop methodology included two types of interventions: keynote lectures with key experts and panel discussions with the authorities of the countries invited. These interventions were moderated by different UNDP representatives and the topics were agreed upon in advance with the speakers.

The discussion effectively succeeded in presenting different views of the low-emission transport landscape in LAC. It also resulted in the establishment an international network of contacts promoting South-South peer cooperation and the presentation of preliminary results (review of primary data) for this study.

The workshop provided feedback on the preliminary results obtained and strengthened the network of contacts, leading to a deeper understanding of progress made to date and barriers to implementation. With the presentations and observations made by the representatives of each country, it was possible to strengthen the knowledge acquired, schedule new interviews and support the collection of primary data.

In particular, it was possible to hear recommendations from experts from the public and private sectors; to gain a better understanding of the future outlook for low-emission transport; and to get a first glimpse of the challenges and barriers that this sector will face in the coming years.

14 UNFCCC, 2023, Global Stocktake.

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