**SECTORIAL MITIGATION ACTION PLAN (SMAP) TRANSPORT SECTOR IN COLOMBIA**

# Background

The transport sector, in its urban and interurban environments, has a direct incidence on the competitiveness of regions, household living costs, and the well being of the country’s population. Hence the priority of this sector in the development of national policy is a must. Colombia’s National Development Plan 2010-2014 establishes two priorities for the sector: 1) infrastructure development, logistics and connectivity; and 2) the consolidation of transport systems in the country’s cities.

In line with these objectives, the National Government executes policies in terms of freight and transport logistics, with the goal of improving service provision, reducing operation costs for trucks, and boosting market and regional/sub-national competitiveness. The Urban Transport National Policy directs the structuring of passenger transport systems in Colombian cities (SETP y SITM)[[1]](#footnote-1) and guidelines for urban mobility issues such as non-motorized means of transportation, and road safety. In the same manner, the National Development Plan (NDP) 2010-2014, under its “infrastructure for competitiveness” framework, defines a mandate to implement strategies and actions that contribute to mitigate climate change through the reduction of green house gas (GHG) emissions in the different transport systems and modalities.

The basis of the NDP 2010-2014, point to urban mobility as “*the support for the different economic and social activities that the country’s inhabitants develop, in different places and times, with the transport system as an articulator*.” In these terms, one of the objectives of the “Friendly Housing and Cities Strategy” of the NDP is to “*structure and implement integral mobility and urban development interventions that are articulated with land-use planning, supporting and promoting massive and non-motorized public transport solutions that are operationally, environmentally and financially sustainable, articulated with demand and land use management measures*.”

# Transport sector characterization

The transport sector participates with 4% of the national GDP and is the sector with the highest energy consumption in Colombia, demanding 35% of the total oil derivates (373,000 TJ in 2009). In terms of GHG emissions, the sector contributes 12% to the national inventory (20 million tons in 2009) and the freight sub-sector is responsible for 90% of that quantity. Figure 1 summarizes the sector’s energy consumption and GHG emissions in more detail.

Figure 2 shows GHG emission per sub-sector and their projection up to 2040. The main assumptions in these predictions where determined through multiple work sessions with sector experts from the public and private sectors during 2012. These experts were nominated by Ministers, guild leaders and CEOs of different companies in the sector[[2]](#footnote-2).

Main assumptions include the number of registered vehicles in the National Unified Transit Registry (RUNT[[3]](#footnote-3)), fuel performance (gallon/kilometer) of different vehicle types, and the emission factor for Colombian fuels (FECOC)[[4]](#footnote-4); which corresponds to the quantity (in grams) of carbon dioxide generated by unit of energy of the fuel (gCO2/Tera jules) and is different for each type of fuel type used in the country.



Figure 1. Energy consumption (E) and GHG emissions in the Transport Sector

Source: Developed based on the Second National Communication to the UNFCCC by IDEAM (2004) and Los Andes University (2013)

Figure 2. GHG emissions for the Transport Sector, projected to year 2040

Source: Los Andes University (2013)

Figure 2 depicts how emissions would increase in coming years, highlighting the participation of private transport -vehicles and motorcycles- towards the end of the study period. This is due to high rates of motorization of these vehicles, which is directly linked to the country’s economic growth and is explained by the tendency of a population to purchase goods, including vehicles, and to increase their level of activity (increased number of trips) as their economic conditions improve. Motorization rates are expected to go from 100 to 600 vehicles for every 1000 inhabitants (saturation levels).

The modeling assumptions of the scenario presented in Figure 2 propose that the quantity of trips made by individual public transport (taxis) will be the same (5%) and that the high use of private vehicles will diminish the demand on public transport systems in cities; which suggests that the size of the stock of this system should not increase considerably and its operation will remain relatively constant in the analysis window. In the freight sector, the main parameter used is the projection of freight transported (tons per year). This value is adjusted for economic growth.

Finally, it is worth mentioning that non-motorized transport maintains the same number of trips and therefore decrease the percentage in which they participate compared to other means of transport.

# Colombian Low Carbon Development Strategy (CLCDS)

Colombia has been a permanent actor in the international climate change negotiations and has demonstrated its commitment towards participating in global mitigation efforts through the formulation of crosscutting climate change policies and the development of mitigation guidelines for the most relevant sectors[[5]](#footnote-5). Within the four strategic lines created by the National Government to fight climate change, the Ministry of Environment and Sustainable Development (MADS) and the National Planning Institute (DNP), designed the Colombian Low Carbon Development Strategy (CLDCS), through which inter-sectorial efforts aimed at de-coupling economic and GHG growth are coordinated since 2011. The goal of the CLCDS is to design and implement policies, programs and actions in each productive sector, that improve efficiency and competitiveness, reduce environmental impacts and provide significant integral benefits to Colombians. Figure 3 depicts the five components that make up the Strategy.

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Figure 3. Components of the CLCDS

This document presents the Transport Sector’s Sectorial Mitigation Action Plan (SMAP). It contains a group of policies, programs and actions that will boost the sector’s development, the achievement of its sectorial goals, and reduce GHG emissions. The SMAPs are an opportunity for the identified mitigation measures to contribute to the achievement of the sector’s development goals as well as the generation of economic, social and environmental co-benefits.

## Development of Mitigation Measures for the Transport Sector

Based on inputs from sectorial experts through several workshops, a series of mitigation measures were identified and proposed for the transport sector. These measures were then studied to calculate their GHG mitigation potential and implementation costs (Annex I). It is important to clarify that modeling assumptions were used in order to identify the order of magnitude of their mitigation potential and the co-benefits associated with their implementation.

The Ministry of Transport proposed different scopes of the mitigation measures, aiming to produce more precise alternatives. This resulted in measures that have several interpretations (i.e. freight transport, passenger transport), or forms/scopes of implementation (i.e. urban, interurban). The result of this exercise was a list of 37 mitigation measures, presented in Annex 2.

## Development of a Survey on Mitigation Measures for the Transport Sector

The methodology defined by the CLCDS suggested the development of a survey to gather information on the sector’s perception of the proposed mitigation measures (see Annex 2), their alignment with the sector’s development objectives, and their potential implementation periods. The surveys were done during the first semester of 2013, and 26 transportation sector stakeholders were interviewed and surveyed. The stakeholders included national level public entities, universities, SPTS administrative entities, multilateral banks, guilds, representatives from the private sector, and organizations that promote sustainable transportation.

As previously mentioned, the sector’s development objectives were identified based on the following criteria: existing policies, the sector’s legal framework, its action plan, the Ministry of Transport’s (MT) budget, and interviews about the survey with MT division coordinators. Through this process, and under the guidelines of the Vice-ministry of Transport, the following objectives were identified:

1. To have a national freight logistics system that integrates provision chains, and promotes inter-modality.
2. Support the implementation of Integrated Public Transport Systems that improve mobility in cities.
3. Strengthen information collection systems in order to speed up procedures and processes in the transit and transport areas.
4. Support and promote the renovation/disintegration of old freight vehicle stock.
5. Reduce the number of annual fatalities caused by transit accidents.
6. Promote sustainable transport projects through the incorporation and strengthening of environmental components in the projects.
7. Increase cities’ competitiveness through comprehensive mobility strategies, which promote efficient and sustainable solutions.

In this manner, the survey aimed to assign a level of importance (between 0 and 5), to each proposed mitigation measure, a potential implementation period, and its level of alignment with the aforementioned sectorial development objectives. Three types of surveys were developed for the transport sector’s main sub-sectors: freight transport, urban transport, and a consolidated version with the 37 measures.

### SMAP Development - Prioritization

Teaming up with the MT’s Transport and Transit Division, the 37 mitigation measures presented in Annex 2 were reviewed, in order to classify them into policies, programs or actions. The result is presented in Annex 3. It is worth mentioning that some measures fall under more than one category, programs that had quantifiable results in terms of mitigation potential and costs were categorized as actions as well.

Following guidance by the CLCDS, five criteria were used to prioritize the mitigation measures. The following table shows the criteria and their weight.

Table 1. Mitigation measures’ prioritization criteria.

|  |  |  |
| --- | --- | --- |
| Variable | Name | Weight |
| 1 | Importance of the mitigation measures for the sector | 20% |
| 2 | Mitigation measures’ alignment with sector priorities | 25% |
| 3 | Mitigation potential | 35% |
| 4 | Implementation cost | 10% |
| 5 | Co-benefits | 10% |

According to the criteria presented in the table above, Tables 2, 3, and 4 present the results of the mitigation measures’ prioritization process.

The text in red indicates the mitigation actions that were discarded due to their low scores. The measures in green are the ones that were not prioritized, but are policies, programs or actions that are aligned with the SMAP, and under way in the MT, as part of its sectorial management.

**Table 2. Prioritization of policies**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Measure | Importance Ranking | Objective Ranking | Co-benefitRanking | GeneralRanking |
| Restructuring and optimization of collective public transport | 1 | 3 | 4 | **1** |
| Promotion of railroad freight transport as complementary/alternative to road transport | 2 | 1 | 2 | **2** |
| Promotion of river freight transport as complementary/alternative to road transport | 3 | 2 | 3 | **3** |
| Restructuring of motorcycle taxes and other fiscal duties according to their level of polluting emissions  | 4 | 8 | 9 | **4** |
| Optimizing logistics chains within cities (schedules, dispatch centers) | 5 | 4 | 8 | **5** |
| Restructuring vehicle taxes and other fiscal duties according to their level of polluting emissions  | 6 | 9 | 10 | **6** |
| Implementation of public bicycle systems | 7 | 5 | 1 | **7** |
| Congestion and pollution charges in cities with more than 300,000 inhabitants | 8 | 6 | 11 | **8** |
| Creation of freight brokers | 9 | 7 | 12 | **9** |
| Parking master plans that promote inter-modality | 10 | 10 | 13 | **10** |
| Improve quality of fuel (sulfur, octane level, international standards, biodiesel and ethanol mixes) | 11 | 13 | 7 | **11** |

**Table 3. Prioritization of programs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Measure | Importance Ranking | Objective Ranking | Co-benefitRanking | GeneralRanking |
| Build accessible, direct, well connected, attractive, continuous and comfortable bike lanes that guarantee the physical and personal safety of the user | 1 | 1 | 1 | **1** |
| Build accessible, direct, well connected, attractive, continuous and comfortable walkways that guarantee the physical and personal safety of the user | 2 | 2 | 2 | **2** |
| Freight vehicle disintegration program | 6 | 3 | 6 | **3** |
| Ensure adequate maintenance and improvement of the country’s infrastructure and transport systems | 3 | 4 | 7 | **4** |
| Increased requirements and control of CDA[[6]](#footnote-6) during testing and emission of the certificate of technical-mechanical revision | 4 | 7 | 4 | **5** |
| Construction of bicycle parking areas and restrooms in transport stations as a way to promote inter-modality | 7 | 6 | 3 | **6** |
| TOD (*Transit Oriented Development*) Promotion Center | 5 | 8 | 5 | **7** |
| Optimization of taxi use (geographic distribution of taxis, parking bays) | 9 | 5 | 11 | **8** |
| Sustainable Mobility Business Plan (SMBP) that include telecommuting | 8 | 9 | 9 | **9** |
| Substitution of the freight vehicle stock with hybrid technology | 10 | 10 | 8 | **10** |
| Promotion of gas fueled private vehicles | 11 | 11 | 10 | **11** |

 **Table 4. Prioritization of actions**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Measures | Importance Ranking | Objective Ranking | Co-benefitRanking | CO2 (Ton/year) | Costs (USD/Ton) | Total Reduction (Ton) | GeneralRanking |
| Substitution of public transport fleet with electric technology | 6 | 7 | 4 | 952,000 | 128.8 | 14,187,000 | 1 |
| Promotion of railroad freight transport as complementary/alternative to road transport | 3 | 2 | 7 | 263,000 | 74.8 | 3,946,000 | 2 |
| Promotion of river freight transport as complementary/alternative to road transport | 5 | 4 | 3 | 1,147,000 | -34.5 | 3,946,000 | 3 |
| Build accessible, direct, well connected, attractive, continuous and comfortable bike lanes that guarantee the physical and personal safety of the user | 1 | 1 | 1 | 1,800,000 | -62 | 1,800,000 | 4 |
| Disintegration of freight vehicles older than 20 years | 4 | 3 | 8 |  |  | 560,000 | 5 |
| Substitution of the public transport fleet with hybrid technology | 8 | 6 | 9 | 1,200,000 | -671 | 4,700,000 | 6 |
| Articulation between housing and transport projects – TOD projects | 2 | 5 | 2 |  |  | 1,900,000 | 7 |
| Promotion of private electric vehicles | 7 | 9 | 6 | 474,000 | 7.5 | 10,428,000 | 8 |
| Substitution of taxis for electric vehicles | 9 | 8 | 5 | 46,000 | -28.6 | 1,147,000 | 9 |

### Development of the Sectorial Mitigation Action Plan (SMAP) – Structure

Taking into account the results presented in Tables 2, 3, and 4, the prioritized mitigation measures have been grouped in a coherent and functional manner, into policy, program or action groups. The results are presented in Table 5, proposing the basis of the transport sector’s SMAP.

**Table 5. Policies, programs and actions prioritized through the Transport SMAP**

| POLICY GROUPS | POLICY COMPONENTS | PROGRAMS | ACTIONS |
| --- | --- | --- | --- |
| Mitigation and Sustainability in Public Transport | Restructuring and optimization of public transport | Ensure adequate maintenance and improvement of the country’s infrastructure and transport systems  | Renewal of public transport fleet |
| Creation of CIUDAT:Center of Urban Interventions for the Advanced Development towards Transport  | Coordination between housing, urban development and transport projects (TOD) |
|  | Substitution of the public transport fleet with electric technology |
| Promote use of alternative means of transportation as complementary/alternative to road transport | Promotion of railroad freight transport as complementary/alternative to road transport |  | Promotion of railroad freight transport as complementary/alternative to road transport |
| Promotion of river freight transport as complementary/alternative to road transport |  | Promotion of river freight transport as complementary/alternative to road transport |
| Complement the National Freight Transport Logistics Policy | Optimizing logistics chains within cities (schedules, dispatch centers) | Program for the Disintegration of freight vehicles  | Disintegration of freight vehicles older than 20 years |
| Creation of freight brokers |  |  |
| Non-Motorized Transport |  | Build accessible, direct, well connected, attractive, continuous and comfortable bike lanes that guarantee the physical and personal safety of the user | Build accessible, direct, well connected, attractive, continuous and comfortable bike lanes that guarantee the physical and personal safety of the user |
| Build accessible, direct, well connected, attractive, continuous and comfortable walkways that guarantee the physical and personal safety of the user |  |
| Construction of bicycle parking areas and restrooms in transport stations as a way to promote inter-modality |  |
| Demand Management | Congestion and pollution charges in cities with more than 300,000 inhabitants |  |  |

### Inter-sectorial Measures

Within the measures proposed by the sector’s working group, some were found to be under the jurisdiction and responsibility of other sectors. The identified measures are directly related to transport operation, but their execution, regulation and control depend on other sectors. Inter-sectorial measures for this SMAP are presented in Table 6.

**Table 6. Inter-sectorial measures**

|  |  |
| --- | --- |
| MEASURE | ENTITY INVOLVED |
| Restructuring of taxes and other fiscal duties according to the level of the vehicles’ polluting emissions | Ministry of Finance/Ministry of Commerce |
| Restructuring of taxes and other fiscal duties according to the level of the motorcycles’ polluting emissions |
| Improve quality of fuel (sulfur, octane level, international standards, biodiesel and ethanol mixes) | Ministry of Mines and Energy |
| Increased requirements and control of CDA[[7]](#footnote-7) during testing and emission of the certificate of the technical-mechanical revision | Ministry of Environment and Sustainable Development |
| Land Use Planning | Ministry of Housing and Territorial Planning |
| Transport infrastructure  | Vice ministry of Infrastructure and the National Infrastructure Agency (ANI) |

### SMAP Definition Meeting

On the 12th of August 2013, a meeting to define the transport SMAP took place. The participating entities were; Vice ministry of Transport, Vice ministry of Infrastructure, Ministry of Environment and Sustainable Development, National Infrastructure Agency, and the National Planning Department.

During the meeting, there was consensus on the measures that were prioritized in the development of the SMAP and their alignment with the needs and opportunities for the sector, in addition to them being aimed at and articulated with the projects the MT develops and currently executes. The need to involve the government’s transport infrastructure development (for all transport means), in the SMAP was highlighted as a must in order to achieve an integral work plan. The recommendation was well received.

Finally, there was a discussion on the most convenient form to assure the implementation of the SMAP within the MT, so it will transform into a formal sectorial policy document that will address climate change issues. Several proposals were discussed, including its framing in a CONPES Policy Guidelines Document. This proposal was approved by the Vice minister of transport, however, the proposal was reviewed with the NPD and found it as not ​​necessary because of the SMAP is consistent with its own policies being promoted by the Ministry of Transport, which can be reinforced with prioritized actions herein.

# International Cooperation Projects related with the SMAP

Currently, the Ministry of Transport (MT) is working in several projects supported by international entities, which have shown interest in contributing to the sustainable development of the Colombian transport sector. These projects are aimed at the objectives and measures prioritized through the SMAP, and can be found in the following table.

**Table 7. Current international cooperation projects in the Colombian transport sector**

| INITIATIVE | DESCRIPTION |
| --- | --- |
| EC-LEDS | Since 2012, US Government has supporting Colombia to build the Colombian Low Carbon Development Strategy (CLCDS), through enhancing technical capacity at the Ministry of Transport. Currently, five transport experts are funded by USAID to support the promotion of transport public policies, programs and projects with climate change mitigation potential.Also, EC-LEDS enhances capacities in low carbon development through different events (seminars, workshops, courses, etc.) for public and private stakeholders. |
| Clean Technology Fund. CTF | The Colombian Government, through its Ministry of Transport, Ministry of Environment, and the National Development Plan, has received funds from the Clean Technology Fund (CTF) to support the National Urban Transport Policy and, specifically, to maximize the GHG emission reduction from the rationalization and optimization of the urban passenger transport service, as well as the promotion of clean technologies for vehicles.To achieve this goal, the MT has decided to: i) Support the broadening of the Integrated Massive Transport System offer through the implementation of Integrated Public Transport Systems that allow cities to quickly migrate to a scheme that guarantees to cover 100% of trips made in public transport, and, in this way, improve the levels of service and their financial and environmental sustainability. ii) Support the inclusion of new technologies (electric or hybrid vehicles) in the Integrated Public Transport System (SITP) in Bogota. iii) SETPs – Non-motorized: towards the promotion of inter-modality between public transport and non-motorized transportation. |
| Global Environmental Facility. GEF | **Demonstration and assessment of battery-electric vehicles for mass transit in Colombia**The Colombian Government, through its Ministry of Transport, Ministry of Environment, and the City of Bogota, has received funds from the GEF to: i) Develop policies, regulations and standards to enable the adoption of electric vehicles in Colombia (buses and other applications). ii) Study the alternatives for re-use/recycling/disposal of batteries. iii) Instrumentation, monitoring, analysis and documentation of electric articulated buses tests (Financing scheme for electric buses). iv) Development of national and municipal capacities, capacity in operators, the automotive industry, the financial sector, etc. v) Result disclosure and communication.**Low-Carbon and Efficient National Freight Logistics Initiative**The Colombian Government, through its Ministry of Transport, and Ministry of Environment, is currently structuring a proposal for the GEF to advance in: i) The implementation of national policies to induce the adoption of efficient technologies in the freight transport sector as a support to the Freight Vehicle Renovation Program. ii) Design and operation of Freight brokers. |
| TRANSfer Project (GIZ) | Support for the development of a NAMA aimed at renovation and disintegration of freight vehicles and the identification of complementary mitigation measures and their implementation strategies.  |
| Partnership for Market Readiness. PMR (BM) | Establish a carbon market between cities, which promotes the development of efficient, accessible and organized urban transport systems that reduce GHG emissions from Colombia’s transport sector. |
| Transit Oriented Development NAMA (CCAP) | Support the formulation of the regulatory framework and economic incentive instruments to generate large-scale urban developments that aim to achieve goals such as: affordable housing, efficient/accessible land use, economic development, quality of life, energy/GHG savings and energy efficient housing, through the formulation of a NAMA. |

# Ministry of Transport Projects/Initiatives related to the SMAP

Currently, the MT is developing several projects that are amply articulated with the objectives and measures prioritized in the sector’s SMAP. These are contained in the following table:

**Table 8. MT actions that are related to the SMAP**

| POLICY GROUP | ACTIONS EXECUTED OR BEING DEVELOPED  |
| --- | --- |
| Public Transport | **Massive Urban Transport National Policy (PNTU) CONPES 3260****Massive Transport Integrated Systems (SITM):*** 6 Massive Transport Systems in operation
* 1 in implementation (Cartagena)
* 1 in structuring phase (Cucuta)
* The PNTU seeks to improve infrastructure associated to public transport
* The PNTU promotes the consolidation of friendlier cities, accessible and inclusive
* The PNTU promotes urban travel with high levels of service, business systems for fleet operation and collection and minimizing environmental impacts.
* The Sustainable Urban Mobility Unit at the Ministry of Transport gives recommendations and monitors construction and systems operation

**Strategic Public Transport Systems (SETP):*** 7 SETPs structured
* 5 SETPs being structured
* The documents CONPES SETPs seeks to organize collective public transport in intermediate-size cities through route restructuring, business formalization, traffic light prioritizing, and the construction and development of public space (i.e. walkway renovation and construction) and some have goals in terms of bicycle route kilometers.
* As with Massive Integrated Transport Systems (SITMs), the National Government finances infrastructure (recovery of existent) and monitors and provides technical support to SETPs projects.

**Strengthening the National Urban Transport Program CONPES 3737****Monitoring of the National Massive Urban Transport Policy CONPES 3368** |
| Non-motorized Transport | * The CONPES for each SETPs Aims for the improvement of public space (i.e. walkway renovation and construction) and some have goals in terms of bicycle route kilometers.
* CONPES 3718 National Public Space Policy, which relates the National Government strategies to improve the public space in Colombian cities.
 |
| Demand Management | * Draft Decree through which criteria are set for the determination of high congestion areas, high pollution areas, or infrastructure built to avoid urban congestion
* Draft CONPES on the National Smart Transport Policy
* Draft Decree through which a technological solution for Vehicular Electronic Charges is adopted.
 |
| Tax Incentives\* | * In 2011, through Decree 2658, the final reduction of tariffs from 15% to 5% was approved for hybrid, gas-powered and electric buses and trucks, as requested by the Ministry of Environment to the Ministry of Commerce Industry and Tourism’s Customs and Tariffs Committee, and to the Ministry of Finance’s Superior Council of Fiscal Policy (CONFIS).
* Through the same Decree, importation of 100 light vehicles (cars, SUVs, and taxis) per year for 2010 and 2011 was approved. The 2011 lot was extended until 2012. Within the lot approved for 2011-2012, 50 electric taxis were imported. These will be used for a pilot project in Bogota.
* Additionally, in the last CONFIS[[8]](#footnote-8) session (July 15th, 2013), the Ministry of Environment’s request was approved for the reduction of the tariff of a lot of 2,250 hybrid vehicles (pluggable of 3,000 cc) and 2,250 electric vehicles with zero emissions, for the next 3 years.
* With regards to the other incentives, in 2012, the Ministries of Environment and Mines and Energy published Resolution 186, through which the tax to added value (IVA) for hybrid and electric vehicles is waived, when they are used for public transportation.
* Finally, as per the Ministry of Environment’s request, the reduction of the IVA for public transport electric buses and taxis (including their chassis and body) was included in the Tax Reform (Law 1607 of 2012). According to article 48 of the aforementioned Law, the mentioned vehicles will be taxed with a tariff of 5% of IVA, instead of 16%. Additionally, according to the same law, all electric vehicles are excluded from payment of consumption tax.
 |
| Road Freight Transportation | **National Logistics Policy CONPES 3547****National Freight Transportation Policy CONPES 3489****Policy Guidelines for the modernization of freight fleet transport and declaration of the strategic importance of the Program for Freight Fleet Stock Renewal and Replacement CONPES 3759****Program for Freight Fleet Stock Renewal and Replacement*** Incentives for the renovation or disintegration of trucks older than 20 years. It is important to mention that since 2005, 6,000 obsolete vehicles were disintegrated and 6,000 vehicle renovation processes have been done.
 |
| Alternative means of transport promotion as complementary/alternative to road transport (fluvial and railroad) | **Vice ministry of Infrastructure:*** Consultancy that established the Multimodal Strategic Plan for Colombia.
* Viability study for change the railroad gauge to international standard.
* Project for the recovery of the Magdalena River’s navigability.
* Updating the regulations for railroad freight transportation.
 |

\*National level initiative led by the Ministry of Environment and the Ministry of Mines and Energy

ANNEX 1. Mitigation measures and their abatement potential and implementation costs. The measures highlighted in blue were not included in the consultation process or in the SMAP development, given that they were not known in the time of these processes.

| Measure | Description | Reduction CO2 (M Ton) | $USD/Ton |
| --- | --- | --- | --- |
| Electric vehicles in the private vehicle fleet | **15%** of electric vehicle participation in the private vehicle fleet by year 2040. Starting date: 2018. | 10.4 | 7.5 |
| Electric vehicles in the private vehicle fleet | 30% of electric vehicle participation in the private vehicle fleet by year 2040. Starting date: 2018. | 19 | 59 |
| Hybrid vehicles in the private vehicle fleet | Substitution of **25%** of the light private vehicle fleet by 2040. Starting date: 2018. | 8.6 | 76.6 |
| Hybrid vehicles in the private vehicle fleet | Substitution of **15%** of the light private vehicle fleet by 2040. Starting date: 2018. | 5 | 134 |
| Hybrid vehicles in the private vehicle fleet | Substitution of **20%** of the light private vehicle fleet by 2040. Starting date: 2018. | 9 | 125 |
| Stricter performance standards  | Starting in 2020, it applies to the whole new fleet between 2020 and 2040. 70% of the fleet would be higher standard vehicles by 2040. | 26 | 25 |
| Eco-driving in private transportation | Starting in 2020, and up to 2040, **30%** of the fleet would be driven under Eco-driving practices. | 6 | -60 |
| Stricter performance standards + eco-driving in private transportation | Starting in 2020, affects only new fleet. Higher performance standards are applied, and eco-driving is practiced at the same time. As a result, by 2040 this combination will have affected **70%** of the year’s stock. | 32 | 12 |
| Electric buses in the massive transport systems of main cities (BRTs). | Substitution of 7**5%** of the articulated bus fleet in the integrated massive transport systems (IMTS) by year 2040. The IMTSs of Bogota, Medellin, Barranquilla, Cali, Cartagena, Bucaramanga, Pereira and their metropolitan areas were considered. | 7 | 52 |
| Electric buses in the massive transport systems of main cities (BRTs). | Substitution of **50%** of the urban public transport buses by 2040. The demand for public transport in Bogota, Medellin, Barranquilla, Cali, Cartagena, Bucaramanga, Pereira and their metropolitan areas were considered. | 1.6 | 105 |
| Electric buses in the urban massive transport systems (medium and small cities) | Substitution of **50%** of the urban public transport buses by 2040. Starting date: 2018. | 14 | 128.8 |
| TOD | Mitigation potential of measures that reduce demand for public transport. Starting date: 2020. It supposes that the private transport fleet distances will be reduced 20%. | 47 | XX |
| Stricter performance standards for public transport – Large cities | The measure is applied to the fleet of new buses that come in each year between 2015 and 2040.  | 6 | -86 |
| Stricter performance standards for public transport – medium and small cities | The measure is applied to the fleet of new buses that come in each year between 2015 and 2040. | 17 | -77 |
| Performance standards (medium and small cities) + eco-driving | Improved performance standards are applied on the new fleet of buses that come in each year from 2015 to 2040. At the same time, eco-driving is applied to the whole fleet. | 34 | -98 |
| Electric taxis in the urban public transport fleet | Substitution of **20%** of the fleet by 2040. | 1.1 | -28.6 |
| Hybrid taxis in the urban public transport fleet | Substitution of **40%** of the fleet by 2040 | 1.3 | -23.4 |
| Substitution of road freight transport with river freight transport \*\*\* | Substitution of a portion of the trips made by road to transport products from for river transport Cundinamarca, Boyaca, Santander, Norte de Santander and Cesar for river transport through the Magdalena river towards Barranquilla. | 17 | -34.5 |
| Substitution of road freight transport with railroad transport | Substitution of a portion of the trips made by road to transport coal. Trips of 11-ton trucks would be being replaced. | 4 | 74.8 |
| Disintegration of the freight automotive fleet | Scrapping of 5,000 trucks per year between 2014 and 2024. The measure proposes to continue with this target between 2024 and 2040. This means that for the period between 2024-2040, 3,000 additional (in reference to the baseline). | 17 | -91 |
| Renovation of the automotive freight fleet | Renewal of the entire automotive fleet older than 20 years. All replaced vehicles are scrapped. By year 2040, 30% of the fleet will be renewed.Starting date: 2015. This action is applied when the scrapping process previously exposed has already been applied. | 27 | -12 |
| Substitution of diesel trucks for Liquefied Natural Gas (LNG) trucks | From 2020 up to 2040, 15% of each years new fleet will be using LNG. | 29 | -75 |
| Increase in the participation of CNG in freight transportation. | From 2020 up to 2040, 15% of each years new fleet will be using CNG. Vehicles have an increased performance standard compared to the CNG fleet. | 18 | -30 |
| More stringent performance standards in the freight sector. |  | 14 | -38 |
| Public bicycle systems (large cities) | ­This measure substitutes 5% of trips made in light passenger vehicles, 5% of motorcycle trips, and 5% of trips in taxis. The goal is to reach 500,000 bicycle trips in 2015, when the measure starts in 7 main cities, up to 1.7 trips by 2040. The goal would be achieved through the implementation of public bicycle systems and an increased use of private ones. | 13 | -79 |

ANNEX 2. Mitigation measures proposed by the MT and included in the survey.

|  |  |  |  |
| --- | --- | --- | --- |
| **Non-motorized means of transport** | Build accessible, direct, well connected, attractive, continuous and comfortable walkways that guarantee the physical and personal safety of the user | **Logistics and Freight Transport** | Promotion of railroad freight transport as complementary/alternative to road transport |
| Build accessible, direct, well connected, attractive, continuous and comfortable bike lanes that guarantee the physical and personal safety of the user | Promotion of river freight transport as complementary/alternative to road transport |
| Construction of bicycle parking areas and restrooms in transport stations as a way to promote inter-modality | Substitution of freight transport fleet with gas engines |
| Implement public bicycle systems | Substitution of freight transport fleet with hybrid technology |
| Regulate and formalize bike-taxis | Optimizing logistics chains within cities (schedules, dispatch centers) |
| **Integral Development** | Develop eco-driving capacity building programs aimed at public transport, truck and urban drivers to incentivize better driving practices. | Creation of freight brokers |
| Coordination between housing and transport projects (densification and mixed land-use around public transport stations/corridors) - TOD | Disintegration of freight vehicles older than 20 years |
| Incentives for telecommuting or virtual working | **Maintenance****and vehicle renovation** | Disintegration of public transport vehicles older than 20 years |
| **Urban public transport** | Marking off exclusive lanes or prioritize specific spaces for public transport | Increased requirements and control of CDA during testing and emission of the certificate of the technical-mechanical revision |
| Ensure adequate maintenance and improvement of infrastructure and public transport systems. | **Private passenger transport** | Congestion and pollution charges in cities with more than 300,000 inhabitants |
| Substitution of the public transport fleet with hybrid technology | Promote no-motorcycle-days |
| Substitution of the public transport fleet with electric technology | Regulate the use of exclusive lanes for carpooling  |
| Restructuring and optimization of public transport | Promotion of gas-powered private vehicles |
| Renewal of public transport fleet | Promotion of electric private vehicles |
| Substitution of taxis for electric vehicles | Company mobility plans (CMP) that include telecommuting |
| Optimization of taxi use (geographic distribution of taxis, parking bays) | Parking Master Plans that promote inter-modality |
| **Energy efficiency** | Improve quality of fuel (sulfur, octane level, international standards,  and ethanol mixes) | Restructuring vehicle taxes and other fiscal duties according to the level of polluting emissions  |
| Increase diesel-biodiesel mix over 10% | Restructuring motorcycle taxes and other fiscal duties according to the level of polluting emissions  |

ANNEX 3. Mitigation measures by categories: Policies, programs or actions

|  |  |
| --- | --- |
| Category | Measure |
| Policy | Restructuring and optimization of public transport |
|
| Program/Action | Build accessible, direct, well connected, attractive, continuous and comfortable bike lanes that guarantee the physical and personal safety of the user |
| Program | Build accessible, direct, well connected, attractive, continuous and comfortable walkways that guarantee the physical and personal safety of the user |
| Program | Ensure adequate maintenance and improvement of infrastructure and public transport systems. |
| Program | Increased requirements and control of CDA during testing and emission of the certificate of the technical-mechanical revision |
| Program/Action | Coordination between housing and transport projects TOD |
| Policy | Restructuring motorcycle taxes and other fiscal duties according to the level of polluting emissions  |
| Policy | Restructuring vehicle taxes and other fiscal duties according to the level of polluting emissions  |
| Program/Action | Disintegration of freight vehicles older than 20 years |
| Program | Construction of bicycle parking areas and restrooms in transport stations as a way to promote inter-modality |
| Action | Renewal of public transport fleet |
| Policy/ Action | Promotion of railroad/river freight transport as complementary/alternative to road transport |
| Policy/ Action | Improve quality of fuel (sulfur, octane level, international standards, biodiesel and ethanol mixes**)** |
| Policy | Optimizing logistics chains within cities (schedules, dispatch centers) |
| Program | Company mobility plans (CMP) that include distance working |
| Policy | Parking Master Plans that promote inter-modality |
| Policy | Creation of freight brokers |
| Policy | Congestion and pollution charges in cities with more than 300,000 inhabitants |
| Program | Optimization of taxi use (geographic distribution of taxis, parking bays) |
| Policy | Implement public bicycle systems |
| Policy/Program/Action | Substitution of the public and private transport fleets with electric technology |
| Policy/Program/Action | Substitution of the public and private transport fleets with hybrid technology |
| Program | Substitution of private vehicles with gas engines |
| Policy/Action | Increase diesel-biodiesel mix over 10% |
| Policy | Promote no-motorcycle-days |
| Program | Regulate the use of exclusive lanes for carpooling |
| Policy/Program/Action | Substitution of freight transport fleet with gas engines  |
| Policy | Regulate and formalize bike-taxis |

1. SETP: Strategic public transport system. SITM: Integrated massive transport system. [↑](#footnote-ref-1)
2. MADS-UNIANDES 2012 presents technical and participation details used in the development of these results [↑](#footnote-ref-2)
3. National Unified Transit Registry. Ministry of Transport. RUNT in Spanish. [↑](#footnote-ref-3)
4. The FECOC is developed by the National Mining and Energy Planning Unit (UPME) [↑](#footnote-ref-4)
5. CONPES 3700, National Development Plan 2010-2014 [↑](#footnote-ref-5)
6. CDA: Centro de diagnóstico automotriz (vehicle inspection center). [↑](#footnote-ref-6)
7. CDA: Centro de diagnóstico automotriz (vehicle inspection center). [↑](#footnote-ref-7)
8. CONFIS: Consejo Superior de Política Fiscal (Council for Fiscal Policy) [↑](#footnote-ref-8)